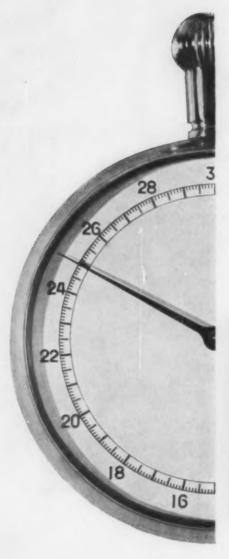
PLASTICS Z

February 1957

page 83 What's new in resins for reinforced plastics

page 100 Polyethylene-coated wire
—methods and applications



molding cycles
hit faster pace
...with **new**single-stage

DUREZ 18441 PHENOLIC

- Saves press time.
- Has low bulk factor, superior electrical properties, excellent finish.

Here is the answer to a widespread need: a general-purpose phenolic with improved characteristics that reduces press time through improved cycles and reduced reject rates.

Durez 18441 has been specially formulated with a very fast rate of cure.

Among the many applications for which it will be found superior are those with molded-in inserts—it will not corrode electrical contacts. Insulation resistance is excellent—well above the average in materials of general-purpose type. Its low gravity is a distinct economy factor, and you'll like its deep, lustrous finish when molded.

This new phenolic is suitable for use in compression or transfer presses. A special granulation facilitates high-speed molding in automatic machines. For your convenience it is stocked in 6, 8, 10 and 12 plasticity.

Try Durez 18441 on one of your next jobs—you'll want more right away! Data sheet available on request.

Phenolic Plastics that Fit the Job

DUREZ PLASTICS DIVISION

HOOKER ELECTROCHEMICAL COMPANY 1202 WALCK ROAD, NORTH TONAWANDA, N. Y.





Sessions synchronizes its designs to the tempo of the times with

Unadorned, a Sessions clock is electrically precise. Its movement can be counted upon to accurately *tell* Time. When appealingly encased in colorful CATALIN STYRENE, the same Sessions will *not only* tell Time—but *sell* it! And that's the movement upon which a clock's successful consumer performance depends!

For clocks, CATALIN STYRENE is a doubly ideal material. In opaque and translucent formulations, it serves—by reason of its easy moldability, low cost and broad range of colors—to encourage the development of exciting new housing designs. In a crystal-clear formulation, this gem of plastics also strongly

shields pretty clock faces . . . and greatly enhances the beauty of their expression.

It might well be that this is the right time for you, too, to investigate the properties as well as the production and sales advantages of CATALIN STYRENE, POLYETHYLENE and NYLON Molding and Extrusion Compounds. Inquiries invited.

Clock cases molded by Majestic Molded Products Inc., Bronx, N. Y. for The Sessions Clock Company, Forestville, Conn.

CATALIN CORPORATION OF AMERICA ONE PARK AVENUE, NEW YORK 16, N. Y.





- Editorial
 - 5 Our new line-up
- The Plastiscope
- 45 Section 1
- 236 Section 2
- **General Section**
- 83 What's happening in resins for reinforced plastics

Details of recent technical and commercial developments, especially in phenolics, polyesters, and epoxies
By Irving Skeist

- 89 Salt bowl for cattle Molded of reinforced melamine, chip-proof bowl updates "primitive" methods for feeding salt to cattle
- 90 Potted splices Permanent connections in electrical power cables are completed by casting epoxy resin in expendable plastic molds
- 92 Preform automation Production is stepped up, uniformity maintained and labor reduced by use of newly developed automatic equipment
- 95 Veils and/or overlays How, why, and when to use them in molding reinforced plastics
- 98 Tanks unlimited Molded modular reinforced plastics panels are gasketed and bolted together to form liquid-holding tanks of any size
- 100 Polyethylene on wire Originally used only as insulation, the mechanical properties of the polymers are broadening the base in wire and cable applications. By W. J. Canavan
- 104 Four hectic months! Largest reinforced plastics airborne part was conceived, designed, tooled, molded, finished, and installed in 120 days By Samuel S. Oleesky
- 106 Heat seals for hollow molded parts Even intricate polyethylene products can be assembled rapidly with newly developed process and equipment
- 108 Plastics Products Plastic ladder; measuring cup; barbecue-grill cleaning brush; closet light

- 197 Molded one-piece plastics awnings Modern architectural innovation combines attractiveness with usefulness
- Industrial valves 199 Rigid PVC valves provide corrosion resistance
- 200 Over 360 styrene parts in model boat Kit contains scaled pieces for 22-in. replica
- 203 Pipe quality seen at a glance User can ascertain quality visually
- 204 Reinforced phenolic housing for hand drill

Color, lightweight, production economies, and physical properties dictated choice of material

- Plastics Engineering
- 111 Shrinkage of thermosets An investigation into and an analysis of the mechanism of the factors involved in shrinkage of thermoset moldings By A. J. Guzzetti
- 132 Vent valve for compression molds
 A tiny valve built into molds will eliminate bulging and sinking of molded parts due to trapped gas or unrelieved suction By G. W. Wilcox
- Technical Section
- 137 High-shear-rate rheological properties of plastics By Arnold C. Werner
- 146 Environmental stress cracking of ethylene plastics By Kenneth A. Kaufmann
- 150 Penton-a new chlorine-containing polymer By E. W. Cronin
- Departments

- 158 Plastics Digest 164 U. S. Plastics Patents 166 New Machinery and Equipment 174 Books and Booklets 186 Plastics Production

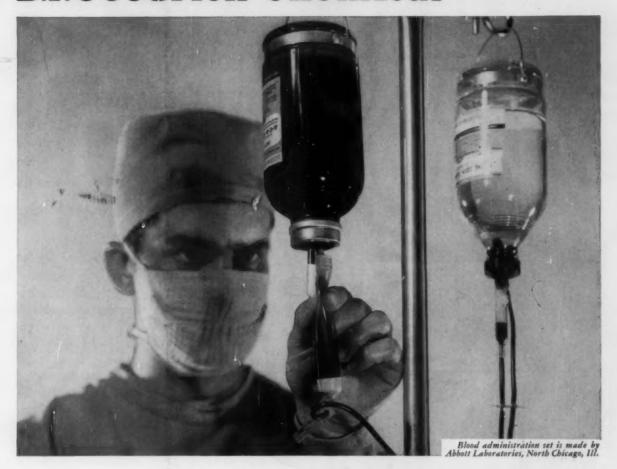
- **Manufacturers** Literature
- The Platform
- 253 Companies . . . People 264 Classified Advertisements 272 Index of Advertisers

Modern Plastics Executive and Editorial Offices: 575 Madison Avenue, New York 22, N.Y.

Modern Plastics published monthly by Breakin Publications, Inc., at Emmett St., Bristol, Conn. Modern Plastics Encyclopedia Issue published as second issue in September by Plastics Catalogue Corp., at Emmett St., Bristol, Conn. Second-class mail privileges authorized at Bristol, Conn. Subscription rates (including Modern Plastics Encyclopedia Issue, which is not sold separately), payable in U.S. currency: In United States, its possessions, and Canada, 1 year \$7, 2 years \$12, 3 years \$17, Pan-American countries, 1 year \$10, 2 years \$17, 3 years \$24; all other countries, 1 year \$20, 2 years \$35, 3 years \$50. Single copies \$75\u00e9 each (Show issue, \$1.00) in the U.S., its possessions, and Canada; all other countries \$2.00 (show issue \$2.50). *Reg. U.S. Pat. Off.

Another new development using

B.F.Goodrich Chemical raw materials



Squeezable Geon keeps blood flowing

THAT plastic filter chamber under the bottle of blood helps make intravenous injection safe and dependable. The chamber, made of Geon polyvinyl materials, is clear, thus serves as a "sight glass." It's flexible, so a light squeeze eliminates clogging. And, since Geon is inert, non-contaminating, and can be sterilized without harm, it meets the strict requirements of this application.

Another major benefit can't be seen. Although Geon is recognized as the standard for uniform high quality in polyvinyl resins, its cost is reasonable. Thus the whole unit is disposable—safer by far than equipment which must be sterilized, packaged, inspected, and stored for re-use.

Geon's quality and versatility can help you improve or develop products. This vinyl can be formed into a variety of things—rigid products like ductwork, or flexible products like tarpaulins... or it can be applied as a durable coating to other materials. It resists the effects of most acids, alkalis, solvents, and oil, can be made clear or colorful.

For complete information write

Dept. DS-2, B. F. Goodrich Chemical Company, 3135 Euclid Avenue, Cleveland 15, O. Cable address: Goodchemco. In Canada: Kitchener, Ont.



B.F.Goodrich Chemical Company
A Division of The B.F.Goodrich Company



GEON polyvinyl materials - NYCAR American rubber and latex - GOOD-RITE chemicals and plasticizers - NARMON colors

custom-molded by Chicago Molded Products



polystyrene bandsaw cover made lighter, stronger, at lower cost...

An important feature of this new Magna 11" Bandsaw is its injection-molded styrene cover. It's lightweight — important to the operator who must remove the cover to change blades . . . it's strong and sturdy. Here's product enhancement . . . at a saving; for it costs less than a die cast part.

What's more, it eliminates painting during manufacture. For the attractive turquoise blue Magnaline color is in the plastic — it can't chip, peel, or fade — ever.

Let Chicago Molded's service engineers help re-examine your products. They may be able, just as they did for Magna, to suggest ways to make them better, and lower cost through the use of molded plastic parts. And our unbeatable facilities mean prompt, economical delivery of any size part you need . . . in any quantity. That's why 60% of our business comes from firms we've served for 15 years or more.

If you'd like to receive news of new plastic applications and developments, send us your name and address. We will be glad to send you periodic copies of the magazine Plastics Progress.

CHICAGO MOLDED PRODUCTS CORP.

1046 North Kelmar Avenue, Chicage 31, Illinois



Our new line-up

Charles A. Breskin has been elected Chairman of the Board of Breskin Publications.

Alan S. Cole becomes President and Publisher

Thus to new honors is elevated a team that for over a quarter of a century has served the plastics industries and





C. A. BRESKIN

A. S. COLE

the packaging industries through this and its affiliated publications as well as through personal leadership.

The Breskin - Cole credo of industrial publishing, when first introduced, was a startling innovation because

it combined beauty of presentation, cross-checking of information at source for veracity, departmentalization to properly serve the individual interests of executive, technical, and engineering readers, the maintenance of strong editorial staffs, the active participation of the men on those staffs in industry association affairs, and extensive field travel by all editors. This credo has proved effective.

In the case of the plastics industries and the end-user industries they serve, the MODERN PLASTICS Competitions, conceived by Breskin and Cole, paved the way for the National Plastics Expositions which have done so much to expand the bases of plastics application. These men first urged the founding of the Society of the Plastics Industry and, indeed, released the then editor of this magazine to become the Society's Executive Vice President. They also pioneered in the formation of the Society of Plastics Engineers. Both men have served in Society councils. Both have traveled extensively at home and abroad to spread the gospel of plastics and their functions to better serve the needs of peoples everywhere.

The need for informative labeling of plastics was first hammered home by this team in its publications and on the platform. The setting up of standards for plastics materials and products received great impetus from their efforts.

This team and its publications and staff will continue to serve in every way possible, with Mr. Cole as executive head of the company. Mr. Breskin will remain as active as ever in all company affairs.





Contents copyrighted 1957 by Breskin Publications, Inc. All rights reserved, including the right to reproduce this book or portion thereof in any form. The name Modern Plastics is registered in the U.S. Patent Office, Printed in U.S.A. by Hildreth Press, Inc., Bristol, Conn. Member, Audit Bureau of Circulations. Member, Associated Business Publications, Modern Plastics is regularly indexed in the Industrial Arts Index and Industrial.

Chairman of the board Charles A. Breskin

President and publisher Alan S. Cole

Editor

Hiram McCann

Managing editor

A. Paul Peck Assistant: Monroe Alter

Senior editor

R. L. Van Boskirk Assistant: Eve H. Marcus

Technical editor

Dr. Gordon M. Kline

Engineering editor

Dr. James F. Carley

Midwestern editor

Val Wright

Associate editors

Joel Frados Sidney Gross William Schlefer

Readers service

Phyllis Kahn

Art director

Donald R. Ruther

Treasurer

Ruth Tulbert

Circulation manager

Robert B. Birnbaum

Production

Daniel M. Broads, director Bernard J. Farina Renée C. Corn

Promotion manager

Philip W. Muller

Advertising

New York 22, 575 Madison Ave. Tel., PLaza 9-2710 B. W. Gussow, advertising manager P. H. Backstrom M. A. Olsen S. S. Siegel R. C. Nilson B. R. Stanton

Chicago 11, 101 E. Ontario St. Tel., DElaware 7-0060

J. M. Connors W. F. Kennedy H. R. Friedman

Cleveland 22, 20310 Kinsman Rd. Tel., SKyline 1-6200 R. C. Beggs

Los Angeles 48, 6535 Wilshire Blvd.

Tel., OLive 3-3223 J. C. Galloway

London S. W. 1, England Panton House, 25 Haymarket Tel., TRafalgar 3901 T. G. Rowden

Frankfurt am Main, Germany Wittelsbacher Allee 60 Tel., 46 143/46 372 G. J. Linder

88



LOOK WHAT THE



M-200

(all steel granulator)

OFFERS...



Whatever your product, the M-200 takes it in stride and grinds up to 300 pounds an hour. The heavy duty knives with the famous double shear action grind the toughest materials—hot or cold sprues—even vinyl and polyethylene—without fluffing

Compact
Design — little
floor space

The M-200 requires only 24" x 27" floor space—just a few inches more than the smallest grinders. The no-fly-back hopper is set at an easy to feed 49" height. This compact design makes the M-200 ideal for beside-the-press as well as batch grinding.

Fastest, easiest cleaning

In seconds, the hopper and screen are detached, exposing the entire interior of the M-200 for quick, easy cleaning. It's simplicity personified! And, the extra heavy all-steel frame of the M-200 is built to last a lifetime. The M-200 cuts down time!

4

Low, low price

With ali the advantages the M-200 offers, you'd expect that it would be high priced. But, it isn't! In fact, when you compare feature for feature, you'll find that no other grinder on the market offers so much for so little money!

ALL

GOOD REASONS WHY

THE M-200 IS THE

BEST BUY ON THE MARKET

If you're looking for performance at a low price, the M-200, latest addition to the popular Marvel Line, is the granulator for you. You can make the best test of all right in your own plant —write or phone today for the full details of the 8 & J 10 day TRIAL TEST PLAN.

5

Plus these other features

¥

Large 8" x 12" throat that handles large area rejects with ease—3 HP or 5 HP motor with starter—big, smooth sliding bin with large sight glass for fastest, easiest removal of ground material—casters at no extra cost.

GRINDING LONG EXTRUSIONS?

Ask about B & J's new exclusive hopper attachment that handles rejected extrusions, regardless of length, without precutting. 22 FRANKLIN STREET

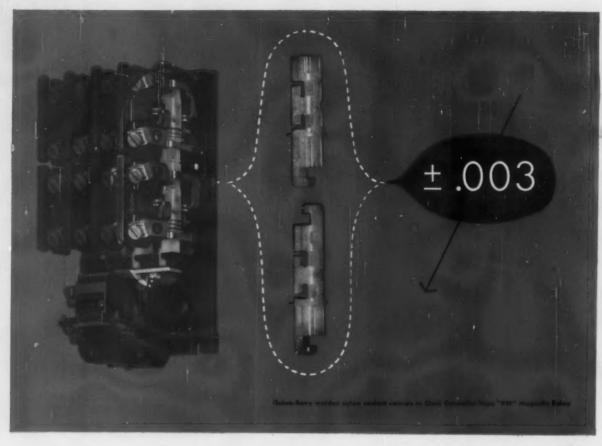
EV------ 0.459/

BROOKLYN 22, NEW YORK

Exclusive Export Distributors: Omni Products Corp., New York, N. Y.

B & J HOPPER HEATER-DRYERS . PNEUMATIC MATERIAL DISCHARGE SYSTEMS





Impossible Tolerances In Molded Nylon

.... not at Quinn-Berry

Extremely close tolerances, dimensional stability, high wearresistance . . . these were the demanding specifications for the
contact carriers shown above. Quinn-Berry's answer to the problem: careful choice of the right plastics material . . . precision
mold design and manufacture . . . skilled pressroom craftsmanship. The result: components of consistent quality which contribute to the trouble-free performance of the Clark Type "PM"
Magnetic Relay.

Step by step, under one responsibility and one control, every job is engineered from die design to finished peduct at Quinn-Berry where the "Unusual Is Routine" in molded thermoplastics. Consult with us in full confidence of the desired result.

DETROIT 27, Mich. Harry R. Brethen 14231 Puritan Avenue Broadway 3-8964

WYNNEWOOD, Pe. Austin L. Wright P. O. Box 12 S0 East Wynnewood Road Midwey 2-5113

MILWAUKEE 13, Wis. John Weiland, Jr. 7105 Grand Parkway Greenfield 6-7161

EAST ROCHESTER, N. Y. Herwood Molded Products, Inc. 607 West Commercial Street Hillside 0626

DAYTON 9, Ohio G. Ross Vines 637 Monteray Avenue Adams 8161

CHELSEA 50, Mass. Joseph Leader 68 Martbaraugh Street Chelsea 3-3484

CHICAGO, Illinois R. H. Frish Room 211 6349 Northwestern Ave. Ambesseder 2-6005 NA.

WE FLY TO SERVE YOU FASTER!

QUINN-BERRY
2609 WEST 12TH STREET, BRIE, PA.

MOLDERS OF ALL TYPES OF DISTRIBUTION ASSISTS



CONVERTIBLE, 19 FT. LARSON BOAT WORKS LITTLE FALLS, MINNESOTA



SUCAJO EL DORADO, 14 FT UNITED ENGINEERING CO. GADSDEN, ALABAMA



HOLIDAY, 14 FT. FLEETCRAFT, INC. WOODBINE, N. J.



THE ANGLER, 14 FT. LONE STAR BOAT COMPANY GRAND PRAIRIE, TEXAS



VIKING, 17 FT. WINNER MANUFACTURING CO., INC.



WAHOO, IS FT. CHALLENGER MARINE NORTH MIAMI, FLORIDA



Reinforced Plastic takes the work out of boat ownership ... it just leaves the FUN!

Celanese serves the fast growing billion dollar a year pleasure craft industry with a diverse line of MR Resins

Extremely economical to maintain, plastic boats require no expensive care. Color can be molded in . . . no caulking, sanding, and painting every Spring for the plastic boat owner! Plastic hulls are not corroded by salt spray or water . . . they're immune to the voracious teredo . . . and patch repairs can be efficiently and quickly made by an amateur. In short, reinforced plastics take a good deal of the work out of boat ownership and add to the enjoyment of pleasure craft.

Celanese experts in reinforced plastic have worked closely with the boat industry in proving the plastic boat. Marcothix, a thixotropic resin that stays put, showed the way to faster production of hand lay-up fabrication—giving more uniform hull thickness and even penetration. A wide selection of Celanese MR Resins have been formulated to fit all standard

methods of lamination, molding, and fabrication.

If you are considering the design freedom, strength, and construction simplicity of reinforced plastics—for truck bodies, architectural panels, chemical tanks, or other products—draw on the technical assistance of a pioneer in polyesters. Write for the latest facts on formulation and fabricating. Celanese Corporation of America, Plastics Division, Dept. 101-B, 290 Ferry Street, Newark 5, N. J. Canadian Affiliate: Canadian Chemical Co., Limited, Montreal, Toronto, and Vancouver.



plastics and resins

For world-wide list of agents see page 200

There is a difference in polyethylenes

specify an ALATHON® polyethylene



superior transparency—Soft goods packaged in film of Alathon are always clearly visible for customer inspection... retain their fresh, unmussed look indefinitely. Readily adaptable to a wide variety of products, film of Alathon keeps sales appeal in...dirt and contaminants out. (Alathon polyethylene resin 10, 34)



SUPERIOR CHEMICAL RESISTANCE — Coatings and laminates of ALATHON make paper, fabric and film resistant to a wide variety of materials including food acids, alkalies, oils and chemicals. Strong, lasting heat seals can be made between materials coated with ALATHON. (ALATHON polyethylene resin 16, 34)



SUPERIOR IMPERMEABILITY — Flexible squeeze bottles made of Alathon keep contents fresh, effective and appealing. Molded in attractive, colorful designs, squeeze bottles of Alathon have greater rigidity... snap back quickly between squeezes. (Alathon polyethylene resin 10, 20, 34)



SUPERIOR TOUGHNESS — Insulation and jacketing of Alathon provide superior protection... have remarkable heat, chemical, moisture and abrasion resistance. Alathon features low power loss and low dielectric constant... remains tough and flexible even at extremely low temperatures. (Alathon polyethylene resin 3, 4, 5)



SUPERIOR DURABILITY—Housewares made of Alattion are sanitary, easy-to-clean and can be economically molded in appealing designs, brilliant colors and versatile forms. (Alathon polyethylene resin 10, 17, 22, 37)

resin for your particular needs



SUPERIOR STRENGTH — Flexible pipe made of Alathon has outstanding long-term burst strength... withstands the repeated cycles of freezing, varying pressures and contact with corrosive soil chemicals. Pipe of Alathon is light in weight and easy to handle... flexible enough to bend around corners and eliminate extra fittings. (Alathon polyethylene resin 25)



SUPERIOR FLEXIBILITY — Foodstuffs packaged in film of Alathon are kept fresh, flavorful and appetizing. Because film of Alathon does not become brittle or deteriorate at extremely low temperatures, it is used extensively to package frozen foods. (Alathon polyethylene resin 10, 14, 22)

FROM DU PONT RESEARCH - THE DEVELOPMENT OF A FAMILY OF SUPERIOR POLYETHYLENE RESINS

The molecular structure of Alathon polyethylene resin is controlled during manufacture to provide a wide range of compositions. Each formulation has certain outstanding properties rendering the resin particularly suitable for specific applications. At the same time, these resins retain the desirable properties inherent in polyethylene. Thus, a selection can be made from this family of polyethylenes to suit a particular need.

Alathon is inert to most common chemicals... has a low rate of water transmission and absorption. Articles molded of Alathon have good form stability over a wide range of temperatures, retaining their form, unstressed, up to a temperature of 219°F. Yet Alathon has extreme, low-temperature flexibility... its brittleness point is below -95°F. In addition, Alathon has excellent electrical properties and is resistant to abrasion and heat. And all these physical and chemical properties remain unchanged with age.

The versatility and superiority of ALATHON are demonstrated in the variety of applications shown at left.

Film of ALATHON, for example, combines durability with an unusually high degree of transparency...provides an attractive, individual showcase for a wide range of products including soft goods, foodstuffs and hardware.

Coatings and laminates of Alathon are particularly important in food packaging. Impermeable and grease-resistant, Alathon keeps flavor and freshness intact.

Molded products of Alathon have extra rigidity and strength. Articles such as squeeze bottles and housewares can be molded in appealing designs, attractive colors and versatile forms.

The dielectric characteristics of Alathon at all frequencies are excellent. Wire and cable protected with insulation and jacketing of Alathon get maximum protection against heat, moisture and abrasion.

Pipe made of Alathon has unusual durability...is able to stand up under the most rugged farm conditions. Lightweight and flexible, pipe of Alathon bends easily around corners and obstructions...provides extremely easy installation.

The properties of Alathon are truly remarkable...offer outstanding advantages in many different kinds of applications. It will pay you to evaluate this unique material in terms of your own operation. For more information, simply clip and mail coupon below.



BETTER THINGS FOR BETTER LIVING . . . THROUGH CHEMISTRY

E. I. du Pont de Ne	mours & Co. (Inc.), Polych	emicals Dept.
Room 192, Du Pont	Building, Wils	nington 98,	Delaware
Please send me mo	re information	on Du Por	ALATHON .

Please send me more information on Du Pont ALATHON polyethylene resin. I am interested in evaluating this material for

Name.

Company. Position.

Street.

City. State.

Type of Business.

In Canada: Du Pont Company of Canada (1956) Limited, P. D. Box 660, Montreal, Quebi



Baby Playthings



Toddler Toys



Housewares



Modern House Fittings



Outdoor Living Aids



Containers & Packaging

Symbols of your potential

through Tupper Corporation



Premiums

• Whatever your custom needs in plastics manufacturing, call on Tupper's wide experience and modern manufacturing facilities. Our large, up-to-date plants, equipped with the best production machinery, are available for materials, injection molding, extruding, vacuum forming, blow molding-and other advanced processes.

The Tupper Engineering Department has developed the greatest number of patents in the industry for polyethylene seals, closures, and dispensers-and other items in other plastics. This know-how can be tapped by you to place your plastic products in a position of leadership.

Tupper seals and other Tupper products are protected against unauthorized manufacture by about 150 U.S. and foreign patents and patents applied for, plus numerous trademarks and copyrights.



Do-It-Yourself Materials

UPPER CORPORATION

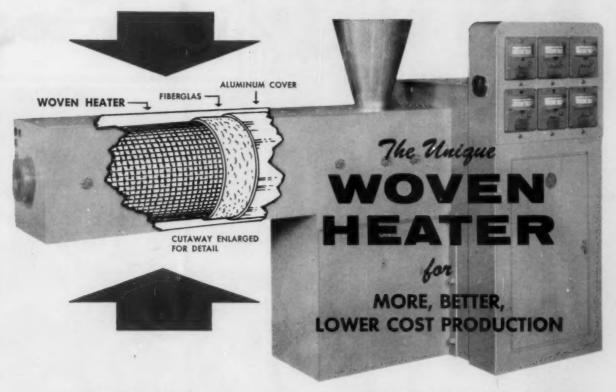
Manufacturers of: CONSUMER, INDUSTRIAL, PACKAGING and SCIENTIFIC PRODUCTS Factories, Laboratories and Sales Offices Massachusetts, Rhode Island, Florida, Montreal, New York Address correspondence to: Dept. M-2

Dept. M-2 Tupper Corporation or

Tupper Corporation

UPPER!

Another Engineering Achievement. D ONLY MPM HAS



MORE Being flexible, MPM Woven Heaters conform more accurately with the surface of the cylinder or die to be heated, thereby assuring more uniform application of heat. The die heat of Woven Heaters is far more accurate since every square inch of the heater is effective. Warping, common to cast or "band type" heaters, is eliminated.

LOWER Tests indicate that MPM Woven Heaters operate OPERATING on 50% or less of the waitage required by so called "band heaters" or more expensive calrod COST heaters cast into aluminum.

LONGER Woven Heaters have a life up to five times greater LIFE than other types.

LOWER The replacement cost of a Woven Heater is lower. REPLACEMENT can be shipped by parcel post to any point in COSTS the world.

CONTROL

MORE ACCURATE With reactor type controls, far greater ac-TEMPERATURE curacy of temperature control can be obtained with MPM Woven Heaters.

MOISTURE MPM Woven Heaters are moisture proof PROOF and their efficiency unaffected by the condensation ordinarily present at the hopper.

BETTER More accurate, better tolerances and RESULTS quality of the extruded product can be expected at no increase in cost.

Thirty three of the country's foremost resin manufacturers acknowledge MPM's superiority and use MPM extruders for extruding experimental thermoplastic compounds and for development work in behalf of their customers. MPM equipment is also in current use in forty foreign countries.



modern plastic machinery corp.

THE MOST ADVANCED PLASTIC PROCESSING EQUIPMENT 15 Union St., Lodi, N. J., U.S.A. . Cable Address: MODPLASEX

IN USE IN THE UNITED STATES AND THROUGHOUT THE WORLD

West Coast Representative: 8510 Warner Drive, Culver City, Calif

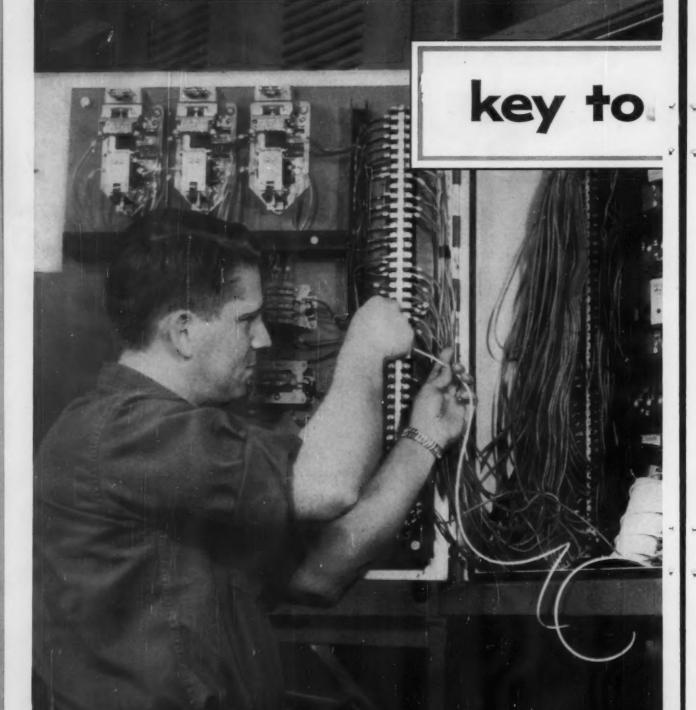


Photo courteey Royal Electric Corp., Pawtucket, R. L., subsidiary of International Telephone & Telegraph Corp., and Pratt & Whitney Aircraft Division, United Aircraft Corporation, E. Hartford, Conn.

mastering a maze

Colored covers are the key to the mysterious maze of wire found in automatic machine tools. By following a simple color code, an electrician swiftly and surely solves any circuit.

Not so simple, however, is finding the *right* machine tool wire covering. Besides the need for bright, permanent colors, such jacketing must be extremely thin and highly insulative. It must also be tough, flexible, and resistant to oil, fumes and age.

After careful testing, a leading wire supplier finally chose a PLIOVIC EDB90V compound for the job. The reasons for choosing PLIOVIC EDB90V were as follows: 1. Its uniform quality 2. Its interchangeability with other UL approved resins 3. Its superior insulation resistance and dielectric strength 4. Its excellent physical properties.

Moreover, being a dry-blending resin, PLIOVIC EDB90V permitted substantial economies in processing. It readily formed a sandy, free-flowing mix with minimum dusting, and displayed excellent extrusion properties. Dry blending also resulted in better end properties through a shorter heat history.

Why not learn more about dry-blending, Underwriters' Laboratories approved PLIOVIC EDB90V? Find out also about the other interesting members of the PLIOVIC family. You can do both simply by writing for details plus the latest *Tech Book Bulletins* to: Goodyear, Chemical Division, Akron 16, Ohio.

CHEMICAL
GOOD YEAR
DIVISION

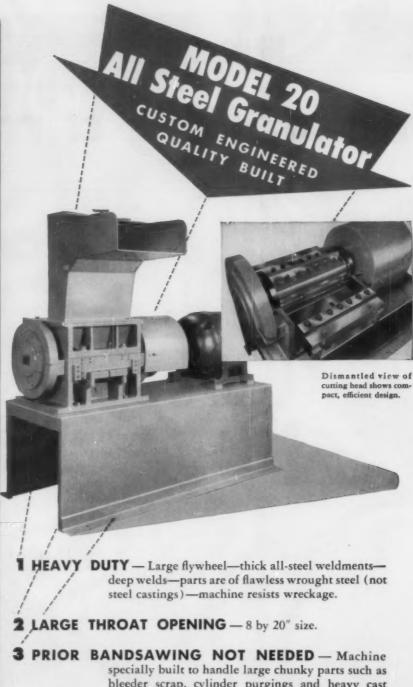
Plastics Department

CHEMIGUM . PLIOFLEX . PLIOLITE . PLIO-TUF . PLIOVIC . WING-CHEMICALS

High Polymer Resins, Rubbers, Latices and Related Chemicals for the Process Industries

Chemigum, Pliofiez, Pliolite, Plio-Tuf, Plievic - T. M.'s The Goodyear Tire & Rubber Company, Akron, Ohio

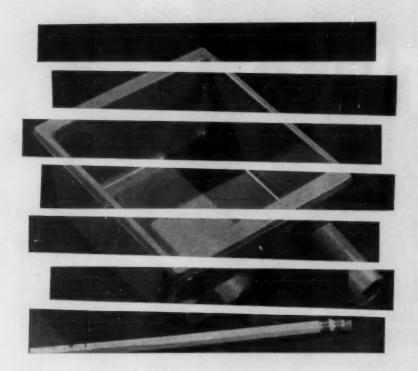




bleeder scrap, cylinder purgings and heavy cast slabs of polystyrene, modified polystyrene and acrylic resins.

ETTER MACHINES FOR THE PLASTICS California Representative:
WEST COAST PLASTICS DISTR.BUTORS, INC. 4113 West Jefferson Blvd., Les Angeles 16, Cal.

PREBREAKERS



take another look... at plastic molding insurance!

Continuous production of your plastic moldings at Kurz-Kasch is insured by (1) a stand-by power system for our molding presses; (2) a policy of designing dies that will last; (3) a staff of top-notch tool makers to keep dies in shape; (4) two generations of specializing in thermo-setting plastic moldings. We know more ways to stay out of trouble than some molders know how to get in.

The dishwasher part shown meets a trick set of specs: smoothness for appearance; glass reinforcing for high impact; good resistance to hot, soapy water; color to match attractive trim.

For a quote you can depend on . . . call Kurz-Kasch.



Specialists in thermo-setting plastics for 41 years

kurz-kasch

1415 South Broadway, Dayton 1, Ohio

SALES OFFICES-New York, Mt. Vernon, Mo 4-4866; Rochester, Hillside 0626; Beverly, Mass., Walker 2-0065; Chicago, Merrimac 7-1830; Detroit, Jordan 6-0743; Philadelphia, Hilltop 6-6472; Dallas, Lakeside 6-5233; San Gabriel, Cal., Atlantic 7-9633; St. Louis, Parkview 5-9577; Atlanta, Cedar 7-5516; Toronto, Can., Oliver 7986

TWO advances in processing thermoplastics

- Calibrating device
- Pipe and cable haul off



Both of these new technical developments ease the manufacture of thermoplastic pipes by extrusion.

- The calibrating device guarantees pipe true to size and shape when forming the extruded raw material. With this device the still soft section of the pipe is sucked to the inside wall of the calibrating device and cooled. In this way the thermoplastic material while passing through the calibrating chamber hardens into exact size and round shape required.
- The pipe and cable haul off grips the pipe securely by six or three rubber covered catterpillar tracks set at an angle of 60° or 120° and pulls in keeping with the extrusion speed. The long working face of the catterpillars in firm contact with the pipe gives a high traction without slip and prevents deformation.

A-Reifenhäuser

TROISDORF WEST. GERMANY Representative for sales and service in USA:

H. H. HEINRICH, INC.

111 Eighth Ave. NEW YORK 11, N. Y.

PRECISION-MOLDED INDUSTRIAL PARTS

with . . .



Tremendous Resistance to Wide Variety of Acids, Alkalies, Salt Solutions and Oils!

THE PERFECT RESIN FOR THE MANUFACTURE OF ANY PRODUCT THAT DEMANDS . . .

- Chemical Resistance
- Lightweight
- Non-Corrosion
- Dimensional Stability
- High Impact Strength
- Machineability
- · Economic Molds
- Low Brittle Point
- High Heat-Distortion

Get the Facts...

Write Today for TECHNICAL LITERATURE

It's good business to use molded industrial Cycolac parts for valves, fittings, acid baths, connectors and insulating uses. CYCOLAC with its high impact strength, toughness, non-corrosive nature is resistant to a wide variety of acids, alkalies, salt solutions and oils. CYCOLAC has wide temperature range of usefulness; outstanding electrical properties plus excellent dimensional stability.



MARBON CHEMICAL

Division of BORG-WARNER

GARY, INDIANA

MARBON CHEMICAL

. . . Precision Resins for Precision Made Products





IMS DRUM TUMBLER

NOW- 3 NEW MODELS

FOR QUICKEST, MOST EFFECTIVE DRY COLOR MIXING

> Features: 34 RPM — Positive Drive Adjustable Drum Holders

T-2

POPULAR MODEL 3/4 HP

Takes drums up to 33" high, and in all diameters up to 22" Capacity 150 lbs.

Price, complete with motor \$595.00

USE YOUR OWN FIBRE DRUMS. SAVE CLEANING TIME!

T-2B

HEAVY DUTY 2 HP

Takes drums up to 37" high, and in all diameters up to 23 1/4" Capacity 300 lbs.

Price, complete with motor \$863.50



T-2C

EXTRA HEAVY DUTY 3 HP

Takes drums up to 45" high, and in all diameters up to 24" Capacity 400 lbs.

Price, complete with motor\$1285.00



INJECTION MOLDERS SUPPLY CO.

3514 LEE ROAD . WYoming 1-1424 . CLEVELAND 20, OHIO



HERE'S WHY THE H-P-M "48" PAYS OFF

at General Machine and Tool Works, Walled Lake, Michigan





FREEZER DRAWER

of high impact polystyrene is molded on



This H-P-M 800-H-48/64
INJECTION MOLDING
MACHINE

big plasticizing capacity, fast cycle speeds, plenty of mold clamping tonnage.

This is **TYPICAL H-P-M** Performance!
How does your **48** oz. compare?

Mr. George Kovac, President of General Machine and Tool Works says, "The H-P-M "48" is one of the best performing machines on the market today," and it's easy to see why with results like this. If you are looking to improve your molding production in 1957—with an eye toward value per dollar invested, check the H-P-M line—6 to 400 oz. sizes to choose from. Get the complete story today.



THE HYDRAULIC PRESS MFG. CO.

A DIVISION OF KOEHRING COMPANY

1877-1957



CHAIN REACTION—The chain link bearings of this woodworking machine—malufactured by Curt G. Joa, Inc., Sheboygan Falls—have helped make the machine perhaps the most outstanding of its kind on the market today. The bearings are made of a graphitized phenolic laminate called INSUROK. Produced by the Richardson Company, INSUROK is a self-lubricating material that has proved especially adaptable wherever oil lubrication might be difficult or harmful. One of the components employed in the manufacture of INSUROK is Mount Vernon duck.

This is another example of how fabrics made by Mount Vernon Mills, Inc. and the industries they serve, are serving America. Mount Vernon engineers and its laboratory facilities are available to help you in the development of any new fabric or in the application of those already available.

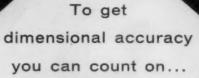
UNIFORMITY
Makes The
Big Difference
In Industrial
Fabrics

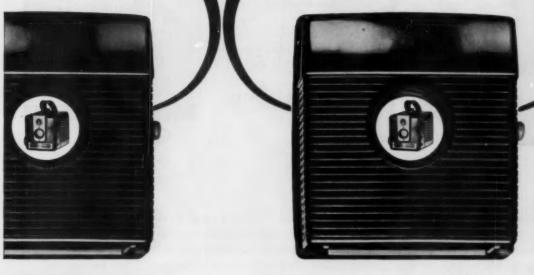
Mount Vernon Mills, Inc.

TURNER HALSEY
Selling Agents

Main Office: 40 Worth Street, New York, N.Y. Branch Offices: Chicago • Atlanta • Baltimore • Bastan • Los Angeles









THE SHUTTER winks. In the interval, a panorama of surging action may be imprisoned within the camera housing. Plenco's phenolic engineers work with the knowledge that the precision operation of cameras, digital computers and other delicate instruments reflect the accuracy of their production. Plenco phenolic molding compounds have been developed and proved for this purpose. Their dimensional accuracy is but one of the excellent properties you can count on with Plenco.

Serving the plastics industry in the manufacture of high grade phenolic molding compounds, industrial resins and coating resins.

"Looks like a bad case of molds!"



This customer wouldn't have ulcers if he'd consulted his molder when he first planned the piece. Trouble was, our friend decided on what he wanted—down to the last detail—and then put the job in the works. Because the project as he set it up was needlessly complicated, he now has a fashionable, but highly annoying, stomach ailment.

If there's one thing we've learned at Boonton after 35 years in the business of molding most plastics by most methods, it's this: For

best results, pick a good molder and bring him into the picture early. Let him know just how the proposed part will be used, and what you expect it to accomplish. Then he'll be in a position to select the right materials and the right process.

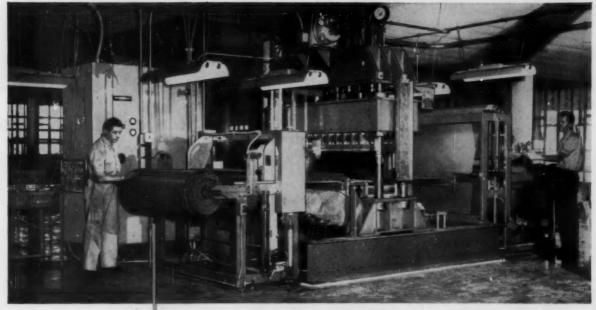
After all, it costs no more to be a little bit careful. And your precautions will help you spend your free afternoons on the golf course, instead of in your doctor's waiting room.



BOONTON MOLDING CO.

BOONTON, NEW JERSEY

NEW YORK OFFICE-CHANIN BUILDING, 122 EAST 42nd STREET, OXFORD 7-0155 CONNECTICUT OFFICE-P. O. BOX 486, TUCKAHOE 7, N. Y., WOODBINE 1-2109





At the Masland Duraleather plant in Philadelphia, sheets of Masland Duran vinyl plastic are electronically welded to a backing, producing a handsome quilted upholstery fabric for automobiles and other uses. The work is done by a large, completely automated Thermatron press in conjunction with a Thermatron generator and indexer. Full rolls of plastic are fed into the press, quilted and rewound in one continuous operation with only supervisory operators.

America's newest cars owe so much to plastics welded by



HIGH FREQUENCY SEALING AND HEATING EQUIPMENT

include . . . Door panels Uphoistered seats Safety cushioning

Convertible tops

Electronically welded

plastic products for the automotive industry

Reservoir bags for windshield wipers

Interior head linings Visor pouches

Tool kits Carburetor filters You've admired that attractive upholstery in many new cars. It's vinyl plastic, weld-quilted by Thermatron equipment. Then there's the safety cushioning of the sun visors and dashboards. Thermatron does that toowelds and shapes the foam filled visor for more shock resistance.

Because of Thermatron, plastics have become an important part of modern automobile design, and the applications are unlimited. If you have a new plastic product in mind, our engineers will be glad to run tests on your own material and make suggestions. Write today to Dept. 111.

Radio and Electronic Products Since 1922



Thermatron Division

RADIO RECEPTOR COMPANY, INC.

SALES OFFICES: 251 West 19th St., New York 11, N. Y. Telephone: WAtkins 4-3633 Chicago: 2753 West North Ave. Las Angeles 22: R. A. Sperr, P.O. Box 6878 St. Louis 19, Mo. R. E. Fisler, 225 Baker Ave., Webster Groves FACTORIES IN BROOKLYN, N. Y.

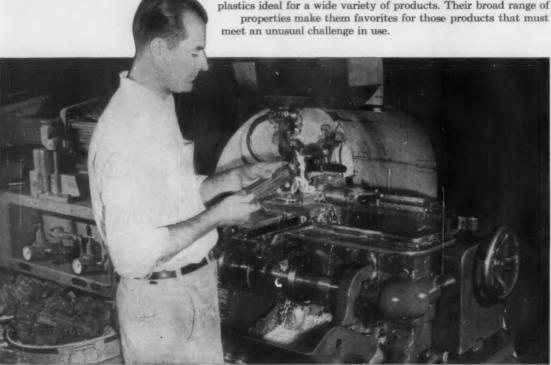


...time-tested workhorse

There's a Hercules material to

Versatile is the word for Hercules plastics. Whether you select one of the Hercocels or Hi-fax—the brand new linear ethylene polymer—you will find a range of properties that is almost sure to meet your needs with tailor-made precision.

HERCOCEL MOLDING COMPOUNDS—This long established family of the Hercules plastics is well-known for the durability and toughness provided by the cellulosics. Good moldability and eye-appeal make these plastics ideal for a wide variety of products. Their broad range of properties make them favorites for those products that must meet an unusual challenge in use



EASILY FABRICATED—Exceptionally easy to extrude and fabricate, Hercocel A has long been a favorite for industrial applications. In tool rod stock it provides unusual toughness plus transparency and colorability. Other properties such as oil, grease and mar resistance and low cold flow characteristics are additional advantages of this economy material.

... SELLS ON SIGHT—The excellent surface luster and rich range of attractive colors provided by Hercocel A make it a natural choice for many products that must sell on sight. Spectacle frames, doll parts, beads, automotive parts, cutlery handles, and buttons are typical of products that are improved by the Hercocel look.

Manufactured by S. A. Wetty and Sons, Royersford, Pa., with rod stock based on Hercules cellulose acetate.

HERCULES



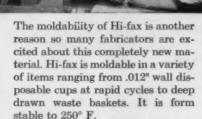


...industry's new favorite

meet every industrial plastics need

HI-FAX—Now available for limited production runs, this new plastic is already recognized for its ability to supply premium properties at surprisingly low cost. What characteristics are you seeking? Heat resistance

or low temperature resistance? Rigidity or toughness? Di-electric strength or chemical resistance? Improved gloss, wide color range? Hi-fax has them all and more.



Molded by American Plastics Co., Cleveland, Ohio, for The Nalge Co., Inc., Rochester, N. Y.

HI-FAX SOLVES A TOUGH PROB-

LEM—The plastic selected for these beakers had to meet a long list of qualifications. For example, it had to be unbreakable, sterilizable, autoclavable, non-toxic, odorless and tasteless. Hi-fax met them all. Resistant to a wide range of corrosive chemicals such as hydrofluoric acid, glacial acetic acid, and aluminum chloride, Hi-fax is ideal for such other uses as carboys, battery acid containers, chemical handling lines, and hospital ware.



For technical data on Hercules plastics, write:

Cellulose Products Department

HERCULES POWDER COMPANY

INCORPORATED

916 Market St., Wilmington 99, Del.





MOLD VINYL HOLLOW GOODS AUTOMATICALLY

MORE ADAPTABILITY! MORE PRODUCTION! MORE PROFITS!



THIS IS WHAT HAPPENS - AUTOMATICALLY

The above machine converts raw materials into finished goods in one continuous operation. The operator doesn't have to be a technician because all the polyvinyl chloride plastisols are scientifically prepared for you and the automatic features of the machine control the cycle completely. The operator handles only the raw materials and the finished product. The research and technical staffs of many of the nation's foremost companies are available to work out the best formulation for your product. You need only be concerned with speed and production.

CONSIDER THE NEW POSSIBILITIES!

Now any hollow article can be molded from vinyl plastisol, vinyl foam or polystyrene expandable beads because this machine adjusts easily to suit all conditions. Think of the new jobs, new orders, bigger profits which can be yours. Think of the many things which now become practical and profitable for you to produce.

ASK FOR MORE INFORMATION — SEE MACHINES OPERATE

Let us show you facts and figures. Let us show you the machine in operation. Let us show you your own product being made. Let us make arrangements for your visit to our plant.



Phone WA 8-2105 Cuyahoga Falls, Ohio

FORMS LATEX DIPPING MOLDS STEEL AND ALUMINUM DIES PLASTIC INJECTION MACHINERY SPECIAL AUTOMATIC

Watch Your Profits

Grow Bigger by using

hIstein

Reprocessed Plastics

When it comes to top quality and important material savings, look to the leader in reprocessed plastics.

Muchlstein is constantly improving technical standards and laboratory efficiency to help lower your production costs. Whether it's Polystyrene, Polyethylene, Vinyl, or any other thermoplastic, you'll find your profits growing bigger when you do business with Muchlstein.

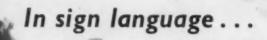
Extra! Ask about Muchlstein's new Polyethylenes:
Modulene and Super Modulene.

M. MUEHLSTEIN 550.

60 EAST 42nd STREET, NEW YORK 17, N. Y.

AMERICA'S MOST PROGRESSIVE SUPPLIER
OF REPROCESSED PLASTICS

REGIONAL OFFICES: Akron · Chicago · Boston · Los Angeles · Toronto · London
WAREHOUSES: Akron · Chicago · Boston · Los Angeles · Jersey City · Indianapolis



PERSPEX' means the best

Perspex' acrylic sheet makes the best signs in any language. It is a very handsome material, extremely tough, light and easy to handle, and will stand up to weather conditions in any part of the world.

The advertising display signs illustrated are Canadian, Dutch and Peruvian. 'Perspex' is selling goods all over the world, every minute of the day-and often far into the night. Because 'Perspex' can be transparent, it is ideal for illuminated displays.

'Perspex' is available in clear or opal sheet or in a wide range of transparent, translucent and opaque colours.



Three-dimensional 'Persper' sign for Shell at The Hague, Holland. Manufactured by Thermo-Plastics Limited,

Dunstable, England.



Illuminated 'Perspex' sign for 'Esso' Petrol, made by Tek Plastics of Toronto, Canada.



'Kolynos' Toothpaste sign, manufactured and installed in Peru. The sign is lit internally.

5 PBBSPBX9 is the registered trade mark for the acrylic sheet manufactured by 1.C.1.

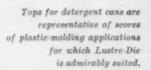
Imperial Chemical Industries Limited, Plastics Division: Export Dept., Black Fan Road, Welwyn Garden Cit;, Herts.

U.S.A. enquiries to: J. B. Henriques Inc., 521 Fifth Avenue, New York 17, N.Y.

Canadian Enquiries to: Canadian Industries Ltd., Plastics Dept., Box 10, Montreal, P.Q.



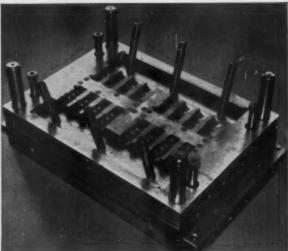






You get high lustre on plastic parts when you use Lustre Die





Die of Lustre-Die, made by Eagle Tool and Machine Co., Hillside, N. J., for manufacture of plastic tops for detergent cans.

If it's high lustre that you're striving for, you'll be more than pleased with the job you get with Lustre-Die, Bethlehem's new plastic-molding tool steel.

Lustre-Die is ideal tool steel for the manufacture of plastic parts because it has properties which enable it to take an unusually high polish. In fact, a glance at Lustre-Die is just about the closest thing to looking in a mirror.

Lustre-Die is a special steel of well balanced analysis. It is made in the electric furnace, and is alloy-fortified to increase its hardenability and mechanical properties. Lustre-Die is heat-treated by oil-quenching and tempering to attain a hardness of Brinell 302-352. It is furnished only in this heat-treated condition.

BASIC ANALYSIS

Carbon 0.50 Manganese 1.00 Silicon 0.30 Chromium 1.10 Molybdenum 0.25 (plus Alloy Fortification)

Lustre-Die is such a clean steel! It is carefully inspected to insure freedom from porosity or surface pitting. It is also easy to machine. Besides, with Lustre-Die there are no additions to cause the type of inclusions which might result in spotty areas on the die surface.

You'll like Lustre-Die the moment you put it to work! Why not order Lustre-Die today from your Bethlehem tool steel distributor.

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.
On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel
Corporation. Expart Distributor: Bethlehem Steel Export Corporation

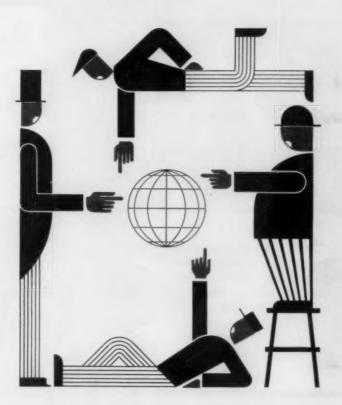
BETHLEHEM TOOL STEELS



CHEMORE CORPORATION

21 WEST STREET, NEW YORK 6, N. Y. TEL.: HA. 2-5275

EVERYBODY LIKES VIPLA



* Annuicolli

PVCRESIN

A MONTECATINI PRODUCT

PROMPT DELIVERY FROM STOCK
IN U.S.A. AND CANADA



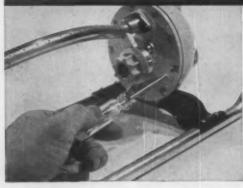
Investigate the assembly savings made possible by PK self-tapping screws



Because P-K Type A Self-tapping Screws have clean, deep slots and sharp gimlet points . . . and because they are consistently uniform, Reznor Mfg. Co. enjoys important savings in the assembly of their gas heaters.

To hold the plastic handle halves of their Instant Heat Soldering Irons together, The Lenk Mfg. Co. specifies P-K Type F Self-tapping Screws. No need for a separate tapping operation. Production is increased and costs reduced—thanks to P-K Screws.







Melnor Industries, Inc. (formerly Melnor Metal Products Co.) puts assembly strength into their famous "Swingin' Spray" oscillating lawn sprinkler by fastening zinc and aluminum parts with P-K Self-tapping Screws—7 Phillips Head Type Z and 18 Type F. They start right

PARKER-KALON DIVISION, General American Transportation Corporation Manufacturers of Self-tapping Screws, Socket Screws, Screwnails, Masonry Nails, Wing Nuts and Thumb Screws

... drive right ... and stay tight.

PARKER-KALON fasteners

Sold Everywhere Through Leading Industrial Distributors
Factory: Clifton, New Jersey—Warehouses: Chicago, Illinois—Los Angeles, California

Siempelkamp

Special hydraulic presses

for the plastics industry for any pressure and temperature with automatic loader and unloader

> All points outside U. S. A. send inquiries direct to: G. SIEMPELKAMP & CO., KREFELD, WEST GERMANY

(Established 1883)

Telex 0853 811

Cable: Siempelkampco

REPRESENTATIVE IN U.S.A. TO RUBBER AND PLASTICS INDUSTRIES

WILLIAM TAPPER 30 SOUTH BROADWAY, YONKERS, NEW YORK

Phone: Yonkers 3-7455

Cable: Wiltapper



REZ-N-LAC

SUPERIOR COATINGS BORN OF CREATIVE PLASTIC CHEMISTRY

Whatever the objective—protective or decorative . . . whatever the use—industrial or consumer . . . whatever the type of plastic . . . there's a REZ-N-LAC coating by Schwartz to help you produce superior products.

Perfected through years of pioneering research, devoted exclusively to plastics, REZ-N-LAC coatings never peel, never flake, never craze—are non-toxic and specifically formulated for each individual plastic application.

Transparent or opaque colors, ranging the full length of the visible spectrum, are custommatched for your individual requirements and for fashion promotions. Fluorescents are also available.

For quality lacquer coatings, always specify REZ-N-LAC . . . often copied but never equalled.

If you have a plastic problem, contact our research laboratories. There's no obligation. Solving plastic problems is an integral part of our service.

Serving the needs of the plastic industry

schwartz

CHEMICAL CO., INC.

328 West 70th St. New York, N. Y.

MANUFACTURERS OF DYES—LACQUERS— CLEANERS—ADHESIVES— FOR PLASTICS



SEEING IT.. IS HALF OF SELLING IT

Joseph Davis Plastics
ACETATE SHEETS
and FILM are perfect for
VACUUM FORMING...
BLISTER and
SKIN PACKAGING





Handsome, practical blister packaging shows off these imported pliers to best advantage, makes them easier to see, easier to sell. The package is made of JODA crystal clear acetate by

> TRISONIA PROCESS, INC. New York City, N. Y.

Cellulose Acetate.. Hi-impact Styrene

Transparent, translucent, opaque.. light-to-heavy gauges

For further information and samples please contact

JOSEPH DAVIS PLASTICS COMPANY

Phone K Earny 2-0980-0981



N. Y. BArclay 7-6421-6422

430 Schuyler Ave., Arlington, N. J.

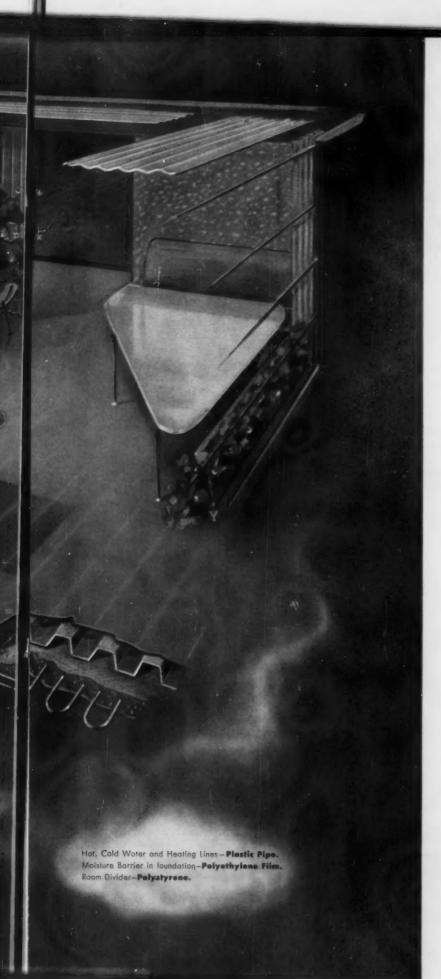
Sales Representatives Conveniently Located



Countertops, Work Surfaces, Dinette, Cabinet faces, Walls-Laminated Plastic. Twin sinks-Polyester Fiberglass. Folding Door-Vinyl.

Refrigerator—All Plastics.
Luminous Ceiling—Plastic Panels.
Honeycomb Flooring—Laminated Plastic.

Cabinet Drawers-Polystyrene (vacuum formed):
Wallpaper-Plasticized.
Plumbing Hardware-Nylon and Ures.



St. Regis presents: the most modern kitchen in the world

MADE ENTIRELY OF PLASTIC

Here is America's first all-plastic kitchen. Imaginative engineering, versatile production facilities and years of experience in plastics, make this kitchen possible.

As one of America's most diversified producers of plastic products, St. Regis maintains six plants where virtually every type of plastic is fabricated for use by every industry. Many companies throughout the nation depend on St. Regis for such various products as printed radio and TV circuits, refrigerator parts, packages and containers...all made out of plastic.

If you have a manufacturing problem, St. Regis will help you "plan in plastic" with no obligations. Write Dept. MP-257, St. Regis Paper Company, 150 East 42nd Street, New York 17, N. Y.



SOLVIC

The following three materials are vinyl chloride

— vinyl acetate suspension copolymers.

**SOLVIC 513 P - Vinyl acetate content:

± 15%. PROPERTIES - Working temperatures: low; flow temperatures: very low
(allows injection moulding without plasticizer).

USES - LP records, vinyl-asbestos floor-tiles.

SOLVIC 523 K - Vinyl acetate content: ± 10%. PROPERTIES - Can be processed at low temperatures; easily produces clear sheeting or sheeting with transparent colours; permits extreme draws when made into sheeting for vacuum forming. USES - Rigid opaque, tinted or clear sheeting, deep vacuum forming.

SOLVIC 535 E - Vinyl acetate content: 5%. USES - General purpose copolymer.

SOLVIC 100 series (122, 124, 136)
General- and special-purpose PVC resins, manufactured by the emulsion process; suitable for unplasticized extrusion and calendering, for blow-extrusion of unplasticized films, for injection moulding of unplasticized articles; Solvic 122 is prestabilized with non toxic products.

SOLVIC 200 series (235, 228, 235D)
General- and special-purpose PVC resins, manufactured by the suspension process; suitable for extrusion and calendering of plasticized articles; having excellent dielectric properties, Solvic 235 D is used for cable insulation.

SOLVIC 300 series (334, 336)
Paste-making PVC resins (plastisols and organosols); suitable for coating of fabrics and paper, dipping, hollow casting or slush molding, and soft cellular products.

SOLVIC POLYVINYLCHLORIDES

Solvic is presently supplying PVC and copolymers in large quantities to plastic users throughout the world. In addition, Solvic manufactures PVC compounds and colour concentrates (master-batches) under the trade name, BENVIC.



Write for additional technical information.

244, Rue de la Loi BRUSSELS (Belgium)

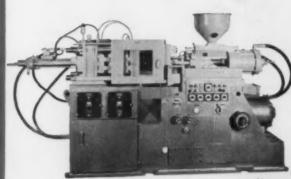
Affiliate companies in Austria, Brazil and Spain

Here's why Fellows leads the way!

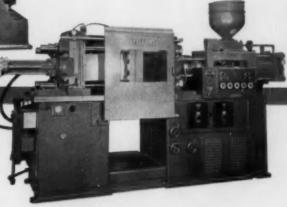
Here are the machines that lower your unit costs with higher speeds, more capacity...and true full-automatic operation: one operator can run three or more machines!

Sensitive, accurate controls simplify setups and change-overs as well as operation. Either the press or the injection assembly retracts for easy purging. Single control sets mold height and clamping adjustment. Stroke length adjustment on both press and injection ends. And many other features!

In plant after plant, more efficient Fellows machines set new standards of production...more pieces per hour, fewer rejects, less operator attention. Ask your Fellows Representative for the facts. And ask him about the Fellows Plan for deferred payment. Write, wire or phone any Fellows Office.



Fellows 3-125: fastest fully-automatic 3-ounce machine on the market! Dry run speeds from 600 to 840 cycles per hour, shots up to 4.5 ounces with the optional pre-pack.



Fellows 6-200: fastest fully-automatic 6-ounce machine on the market! Dry run speeds from 490 to 650 cycles per hour, shots up to 9 ounces with the optional pre-pack device.

Fellows

injection molding equipment

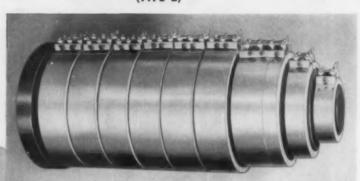
THE FELLOWS GEAR SHAPER COMPANY, Plastics Machine Division, Head Office and Export Department: Springfield, Vermont Branch Offices: 319 Fisher Building, Detroit 2 • 150 West Pleasant Avenue, Maywood, N.J. • 5835 West North Avenue, Chicago 39 6214 West Manchester Avenue, Los Angeles 45

PROVED in Many Installations

THERMEL®

(TYPE B)

DESIGNED SPECIFICALLY
FOR ALL MAKES AND MODELS
OF INJECTION
MOLDING MACHINES



Typical Installation



THESE ADVANTAGES:

- Full Circle Heating No Cold Spots.
- Positive Pressure expansion contact of aluminum shoes.
- Rapid Assembly installation of band or any part in seconds on HOT CYLINDERS.
- Contamination of Terminals and Wiring reduced to minimum.
- Exceptionally long-life Tubular Elements even at 440 volts.
- Complete Interchangeability of individual component parts.
- Semi-Flexible adaptable to ¼" variation in cylinder diameter.
- Cost competitive with ordinary strip types.
- Available 1½" or 2½" widths.
 Diameters 4" to 12" I.D. standard.

ONE WEEK DELIVERIES NOW BEING MADE

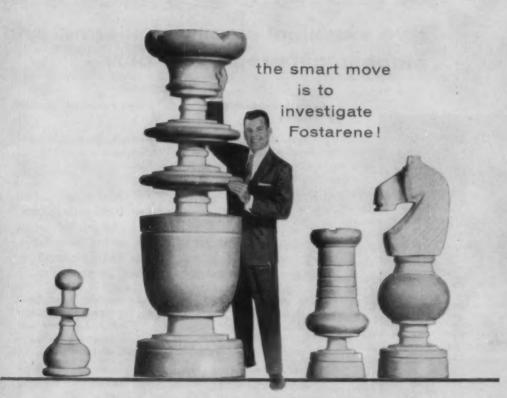


Thermastrip Bands showing details of construction, including grooved aluminum shoe and tubular elements.

Write - wire for full details

Thermel

9410 W. Robinson Road Franklin Park, III. A suburb of Chicago



You've got a molding problem! You want a polystyrene that's more durable, more lustrous, more dependable in its yield of perfect pieces.

Have you looked into Fostarene?

Fostarene is a product of a pioneer in plastics for over 30 years. In talent and equipment, Fostarene's research facilities are second to none . . . and growing!

The result: Better performance, better service for more and more molders who have made the discovery you can make-that when it comes to polystyrene, the smart move is to investigate Fostarene.

STYRENE PLASTICS . GENERAL-PURPOSE . HIGH IMPACT . HIGH FLOW AVAILABLE IN PELLETS, GRANULES AND FINE GRIND FOR DRY COLORING . . . IN CRYSTAL CLEAR AND A FULL RANGE OF CUSTOM COLORS

BRANCH OFFICES: AKRON . CHICAGO . BOSTON . LOS ANGELES . WAREHOUSES: AKRON . CHICAGO . BOSTON . LOS ANGELES . JERSEY CITY A PIONEER IN PLANTICS FOR OVER THIR

EXCLUSIVELY REPRESENTED BY: H. MUEHLSTEIN & CO., INC., DE. 42M S. H. I.I. MANUFACTURED BY: FOSTER GRANT CO., INC., PETROCHEMICAL DIVISION MONOMER PLANT, BATON ROUGE, LA. . POLYMERIZATION PLANT, LEOMINSTER, MASS.

In sealing, potting and encapsulation-

EPON RESINS

give excellent electrical, thermal and mechanical properties, plus—



Applying Epon reein sealing compound, formulated by Epoxylite Corporation, El Monte, California, to a 400-kva transformer winding at Larsen-Hegue Electric Co., Los Angeles, Calif.



Thoxene Clamp-Cost, an Epon resin cable splicing compound, produces a weatherproof, abrasion-resistant coating with high electrical insulation. Manufactured by Woodmont Products Inc., Huntingdon Valley, Pa.

excellent dimensional stability

outstanding adhesion to metal, glass, plastics

J high mechanical strength

exceptional dielectric properties

Although relatively new, the Epon resins have won an important place in electronic and electrical manufacture. Their applications are manifold . . . in printed circuit laminates, transformer and motor sealing compounds, potting compounds for components and subassemblies, protective enamels, adhesives, tool and die materials.

For potting and encapsulating—the excellent dimensional stability of Epon resins, which can, for example, withstand solder bath temperatures without ill effect, and their outstanding adhesion to metals and glass assures airtight enclosure of delicate components and vacuum tubes

As adhesives—solvent-free Epon resin formulations cure at room temperature with contact pressure alone; form powerful bonds between glass, metal, wood or plastic.

As sealing compounds—varnishes and enamels based on Epon resins provide excellent moisture sealing plus outstanding resistance to solvents and chemicals, even at elevated temperatures.

For laminating—Epon resins laid up with inert fibrous fillers produce base laminates that have superior dielectric properties and can be sheared, punched, drilled and bath soldered.

Write for information on the use of Epon resins in electrical and electronic applications.

SHELL CHEMICAL CORPORATION

CHEMICAL SALES DIVISION, 380 Madison Avenue, New York 17, New York

Adamin - Baston - Chicago - Coroland - Bastoli - Resolan - Los Arquite; - Resola - New York - Son Francisco - Sh. Seri-St. CAMABA: Chemical Bivision, Shall Oli Company of Canada, Limited. - Mandred - Teresio - Vancover



The Plastiscope

February 1957

News and interpretations of the news

By R. L. Van Boskirk

Section 1

Acrylates have potentiality for great new future markets. The acrylic family is spreading out in all directions. There are three basic members of the family, each of which is used to provide different end products for the consumer. Each also requires basically different raw materials for its production, although there is some overlapping—which is, however, of more concern to the individual chemist than to laymen users of plastics materials.

Foremost member of the acrylic family is methyl methacrylate with which the plastics industry is well acquainted and going to become even more so in the next five years. Another member is acrylonitrile, used for textiles, as a copolymer with styrene, and in nitrile rubber, which in turn is used for nitrile latex and oil-resistant rubbers and to some degree as a modifier with vinyl chloride and phenolic resins.

The third series in the acrylic family are the acrylates, produced for many years by Rohm & Haas; but that firm's promotion of the material has been conservatively cautious. Carbide and Carbon started production of acrylates a couple of years ago. Goodrich Chemical has conducted extensive research with acrylates since before World War II—even produced acrylate rubber as a satisfactory man-made rubber; acrylate rubber, however, gave way to styrene-butadiene when the war emergency forced adoption of that more plentiful possibility at the time.

Many uses for versatile acrylates. There was a flurry of excitement concerning acrylates a few years ago when polyacrylates and sodium acrylates were used as soil conditioners of various types, but that potential has never grown large. Use of acrylate as a paint emulsion material in competition with styrene-butadiene and vinyl acetate latices has moved briskly ahead in the last two years and looks highly promising. Another application for acrylates is in the textile industry where it is used for sizing and finishing, including a widely used nylon size.

Another new potential of great interest is in thickening agents for water systems used in medicine, cosmetics, and paints. When Carbide entered the field, they mentioned another use—that of ethyl, butyl, and 2-ethyl hexyl acrylate for permanent or built-in plasticizers for vinyl chloride, vinyl acetate, and styrene. Materials with built-in plasticizers, or internally plasticized materials, are supposed to be superior for use at higher temperatures since there would be no exudation. In addition, the acrylates also give stretch, flexibility, and softness. Other uses for acrylates are for coating and finishing treatment

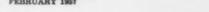
^{*} Reg. U. S. Pat. Off.

of paper, textiles, and leathers. Still another use is claimed to be in synthetic rubber foam where acrylates are reported to have been successfully used in England.

- New producer enters acrylate field. Celanese Corp. of America is the latest to join the field in acrylate production. The company has announced the start of construction on an 18 million-lb.-capacity plant for acrylate esters in Pampa, Texas. Products will include methyl, ethyl, and butyl acrylate, with start-up scheduled for late 1957. Other acrylates will be developed and plans include later expansion if needed. Formaldehyde and acetic acid, both produced in large quantity by Celanese, are some of the raw materials that will be used in the process. It should be noted that Celanese is also a producer of plasticizers and vinyl acetate, both of which are materials that are potential competitors of acrylates in some fields. Vinyl propionate, another Celanese product about which little has been said since it was introduced about a year ago, is also a contender for some of the end uses suggested for acrylates, particularly that of a copolymer with vinyl chloride. At least such uses were claimed when the material was first introduced.
- Adhesives for vinyl, Teflon, and other plastics. A new pressure-sensitive adhesive in film form is being marketed by Rubber & Asbestos Corp. The new adhesive film is basically a porous paper impregnated with pressure-sensitive adhesives in such a manner that the paper essentially disappears, leaving a solid adhesive film. The product is actually a liquid adhesive in solid film form. "No mess, no liquid, no rub in." It could have scores of uses—maybe on the back of a vinyl floor tile that would simply have to be pressed down to make it stick. It will even stick to Teflon. Any plastic that needs to be stuck to something is a candidate for trial by this most interesting new adhesive.

Another practical suggestion on adhesives, particularly for vinyl, comes from National Adhesives which has announced three new solvent-type adhesives for vinyl chloride that can be used for such purposes as adhering film to cloth, paper, or paperboard by roll-coating, air knife, or knife-coating, and are suggested for lamination of vinyl film to latex-saturated paper. (See page 238 for details.)

- Fast work in temporary molds. Apex Plastic Co., Detroit, Mich., has developed a new system for quick delivery of a reinforced plastic item while awaiting completion of steel production tooling. The initial job was to produce 1600 air conditioning ducts in 17 days. A reinforced plastics mold, 53 in. long, 22 in. wide, 10 in. high, and weighing 1000 lb., was built and turned out as many as 302 pieces a day; on the 17th day after receipt of the inquiry, the 1600th piece was run. The company believes that its method of plastic tooling for molding is capable of producing as many as 10,000 to 12,000 pieces in matched plastics molds for short run jobs or whenever it is essential to have finished pieces before the metal molds can be built.
- Plastics enterprise in Manchester, N. H. Lamex Chemical Corp.'s new facilities at Manchester, N. H., were officially opened recently at ceremonies presided over by Joseph C. Foster, president of both Lamex and Foster Grant. Lamex is utilizing about 70,000 of the 550,000 sq. ft. available, primarily for production of plastic (To page 49)





General Tire's Chemical Division has come up with the solution to production problems and high reject rates caused by gelled particles in extrusions! The solution is VYGEN 120, a straight PVC resin especially suitable for dry blend extrusion operations.

VYGEN 120 has a narrow range of particle size distribution and a fast, uniform rate of solvation during dry blending. When blended with either monomeric or polymeric plasticizers, this resin produces high-quality, "fish eye"—free extrusions.

If you're extruding garden hose, welting, gaskets, profile extrusions or similar items, VYGEN 120 is made for you! Write today for samples and technical information on how General's newest PVC resin can improve your product and profit pictures.



Creating Progress Through Chemistry

THE GENERAL TIRE & RUBBER COMPANY

VYGEN®

CHEMICAL DIVISION

AKRON, OHIO

Get maximum jetness in Polystyrene

with savings of TIME, BLACK COSTS and REJECTS

Use Columbian's

COSTYRENEBLAK-CJ

35% dispersion of colloidal carbon black in polystyrene resin

- Easier compounding...on two-roll mill or in extruder. No pre-milling needed.
- Fewer rejects... better dispersion, less streaking. Cleaner, less danger of contamination.
- Economy...a little goes a long way.

COLUMBIAN CARBON DISPERSIONS FOR EVERY PLASTIC

- · COVINYLBLAKS*
- · COETH LOBLAKS *
- · COWAXBLAKS
- COACETATEBLAKS



COLUMBIAN CARBON COMPANY

380 Madison Avenue · New York 17, N. Y.

OCOLUMBIAN Carbon Blacks are available in three forms: POWDER · BEADS · DISPERSIONS O

The Plastiscope

(Continued from p. 46)

bottles. Machines for production of polyethylene film and polystyrene sheet have been set up and will soon go into operation. The company's project to produce nylon from caprolactam monomer will begin early next spring. Trade talk is that capacity will eventually be about 1 million lb. annually and it is assumed that the company's bottle operation will consume a good share of that production. Operations of Lamex, the parent company of Precision Extruders which was an early plastic bottle producer, were first established in Leominster five years ago.

- Visking stockholders approve acquisition by Union Carbide. Visking stockholders have approved the acquisition of their company by Union Carbide. The transaction calls for the exchange of one share of Union Carbide stock for each two and one-half shares of Visking. Statisticians say the amount involved is equal to from \$90 to \$100 million. A new division of Union Carbide has been set up known as Visking Co. Management of Visking will remain in its present hands. Visking was founded in 1925 to make casings for meat—pioneered the use of cellulose (skinless) meat casings. The company was reportedly the first to produce vinyl and polyethylene gun covers during World War II. The plastics division was formed in 1946 and since then has become the largest producer of polyethylene in the world. Visking employs over 3000 people in the United States and Canada, has food casing plants in Chicago; Loudon, Tenn.; and Lindsay and Ajax, Canada, and polyethylene film plants in Terre Haute, Ind.; Fremont, Calif.; Flemington, N. J.; and Lindsay, Canada. Nothing has been announced concerning Visking's film plant in England.
- License for plastisols with Monomer MG-1. Non-exclusive, non-assignable licenses allowing plastics processors to make plastisol-fabricated vinyl plastics using Monomer MG-1 are now being offered by Union Carbide and Carbon. The company will make available to licensees the results of its research program on plastisols. Plastisols based on MG-1 produce resins with a hardness range which it is claimed cannot be achieved with conventional plasticizers. Such plastisols are expected to find markets in flooring tiles, toys, wire coatings, tank linings, foams, and sponges.
- Growing uses for Mylar. The use of Mylar as a laminate over cloth for fairly wide strips of decorative trim in higher priced automobiles became well established in 1956 automobiles. There are some interesting new additions in the 1957 cars. Ford and Mercurys have from 15 to 20 yd. each of Mylar over vinyl, cloth, or paper for welting used as trim on door panels and around seats. Another variation in the Chrysler cars is clear vinyl over a core of woven Mylar to give a metallic effect.

Another Mylar development in sheet metallization, by Coating Prod-

ucts, Englewood, N. J., is 1-mil stock sheets of unsupported Mylar in chrome finish with pressure-sensitive adhesive for non-moistening applications. It is suggested for the label, decal, point-of-purchase, silk screen, display, and decorative fields. It can be used for outdoor signs and bumper strips without lamination to other materials.

Linear polyethylene applications. Two more companies are now in the market with products produced from low-pressure-processed ("linear") polyethylene. The Plastic Film Sales Dept. of Kendall Co., Chicago, has announced a new series of linear polyethylene calendered films. Gages range from 0.004 to 0.025 in. and widths up to 32 inches. The company is also offering blends of 75, 50, and 25% linear polyethylene with regular polyethylene. Applications will include wire and cable insulation, boilable food packaging, vacuum forming, and packaging where additional thermal properties are necessary.

Linear-type polyethylene bottles of foods, pharmaceuticals, and cosmetics which will withstand steam sterilization at 250° F. for 30 min. have been put on the market by the Plastic Container Div. of Continental Can Co.

- Weatherproof overlay for plywood. Crezon, a resin-impregnated cellulose fiber sheet applied to a plywood panel and then permanently fused to the wood under heat and pressure, is ready for marketing by Crown Zellerbach Corp. It will be used for such products as sidings, signs, boats, and handyman panels.
- Escambia on stream. Commercial production of polyvinyl chloride resins has been started by Escambia Chemical Corp. at its Pensacola, Fla., facilities. The following types will be produced: 1250, a high-molecular-weight resin, recommended for extrusion of shapes and profiles and for calendered film; 1225, an intermediate-molecular-weight resin, suggested for supported and unsupported sheeting; and 1200, the lowest-molecular-weight resin in the series, designed for flexible and rigid sheeting.
- Vinyl chloride in Japan. The Japanese Geon Co., Ltd., Tokyo, an associate company of B. F. Goodrich Chemical Co., has begun production of polyvinyl chloride at its new plant at Takaoka in northwest Japan with an initial capacity of about 13 million lb. a year, which will soon be expanded. The company's original plant at Kambara in southern Japan began production in 1952 with a capacity of 6 million lb. a year. When planned expansion is completed next year, total capacity of the two plants will be 50 million lb. a year. Goodrich also has associated companies in England, Brazil, and Mexico, the latter two having recently doubled capacity.

Monsanto is the other American firm that has an associated company in Japan with a capacity of over 14 million lb. a year, but plans are on foot to double that capacity within a year or so. There are also several domestic producers in Japan. Total consumption has grown from 19 million in 1952 to 71 million in 1955. Japan is still importing a sizable amount of vinyl chloride from Europe despite its large domestic production. Use of vinyl film for agricultural purposes such as protection of rice seedbeds to prevent early fall freeze-up is a major outlet. Per capita use of vinyl chloride in Japan was about 0.8 lb. in 1955 compared to 3.25 lb. in the United States.

For additional and more detailed news see Section 2, starting on p. 236.



PRECISION FABRICATION DIVISION

Our Comco division is a complete custom service for the precision production of electronic, aircraft and industrial parts and assemblies fabricated from all grades of PHENOLIC LAMINATES, FISH PAPERS, FIBRE, NYLON, etc.

COMCO PLASTICS. INC. 97-24 Albert Road . Ozone Park 17, N. Y

Phone: Michigan 1-0934

Write for New "Square Foot Converter" for sheets up to 67" x 102" -also "Plastic Properties Chart MP"

-always a dependable source!

We're "stacked-up" to serve you . . Fast!

Apace with each day's increasing demands, we warehouse "in depth" and for immediate delivery, the industry's largest and most complete range of plastic materials . . . All types-sizes-thicknesses. All colors -and all formulations quality-certified for uniformity!

Commercial's specification sheets with prices, covering your specific material requirements, may well serve as proof that what you want is what we have. Request your copies today!

BRANCHES:

PHONE: GRamercy 7-5000



PLASTICS AND SUPPLY CORP. 630 BROADWAY, NEW YORK 12, N.Y.

1039 Westside Dr., Greensboro, N. C. 3801 N.W. Second Ave., Miami, Fla. 119-9th St., Pittsburgh, Pa.

SINC

HARSHAW STABILIZERS BARIUM STANDARD

for the Vinyl Plastic and Coating Industries

HEAT

2-V-4

In these five Standard Units are all the necessary components to control effectively the degradation mechanisms that take place in polyvinyl chloride resins on aging, during heat processing or on exposure to sunlight. They are widely used alone and in combinations for specific effects in clear and opaque stocks. Their advantages have been proven over other tested materials, such as those based on tin (which frequently decolorizes effects of degradation without correcting them) or on lead (which frequently contributes to oxidation and breakdown on aging). We also supply combinations of components selected from these five Standard Units, to correct special conditions encountered in each Vinyl Processing Industry.

Write for information about stabilizers designed for versatile and inexpensive use in formulations employed in your particular vinyl processing industry.

Is it for -

Quality Vinyl Flooring? Non-Plating Calendered Stocks? Maximum Clear Sheets? **Non-Sulfur Staining Films?** Low Cost Clear & Opaque Hose? Top Physical Properties in Rigids? Air-Releasing Plastisols? Controlled Slush Molding?

This Stabilizer System is for

CLEAR SHEETS

Cd 2-V-4

Org 8-V-1

The HARSHAW CHEMICAL Co.

1945 E. 97th STREET . CLEVELAND 6, OHIO

We invite you to prove to yourself ...





that the

MOSLO

Plastic Injection Molding Machine

will shorten
overall cycles
and
increase
Your Profits

West Coast representatives,
The Rainville Company
of California, Inc.,
1420 South Garfield Avenue,
Alhambra, California.
Phone: CU 3-4465.

It is said "Proof of the Pudding is in the Eating." Likewise, "Proof of Performance is in Demonstration"—and that is exactly what the Moslo Machinery Company is going to prove to you.

From March 11 through April 13 the Moslo Engineering Staff in co-operation with their west coast representative, the Rainville Company of California, Inc., will have a two ounce and a three ounce model of the famous Moslo line in actual operation.

You are cordially invited to visit this private showing to be held from 9 to 5, in our display room at 625 West Jefferson Street, Los Angeles, California. We would welcome the opportunity to demonstrate the machines on exhibit, using your own molds and materials. Full capacity shots no problem.

When you actually see this production performance, you will prove it to yourself that a Moslo injection molding machine is the world's fastest and most advanced design.

Come in or contact either our Cleveland office or our west coast representative to arrange for an appointment.

MOSLO MACHINERY
COMPANY
2437 PROSPECT AVENUE · CLEVELAND 15, OHIO

Why use this much heat

when this



is all you need?



See the difference . . . save the difference

with CHROMALOX adjustable-area Far-Infrared Heaters

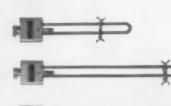
The new Chromalox URAD heater lets you match your heat source to your work size, in vacuum forming, embossing, resin finishing and curing, vinyl fusing, and post forming operations. Into one basic housing you can install up to 27 different heated lengths, which can be varied with the size of the work.

You can do-it-yourself too. Chromalox Far-Infrared elements are designed with a sliding fit that lets you interchange elements anywhere along the housing length. No more wasted heat when you go from one work size to another.

This new Chromalox Far-Infrared versatility means real dollars and cents savings along with the built-in advantages of Chromalox Far-Infrared: metal-sheathed, unbreakable element; infinitely variable output; high intensity, color-blind and uniform radiation.

Your Chromalox representative can give you

detailed suggestions of the application of new Chromalox adjustable Far-Infrared Heaters. Or, write us for a copy of Bulletin CS-607.

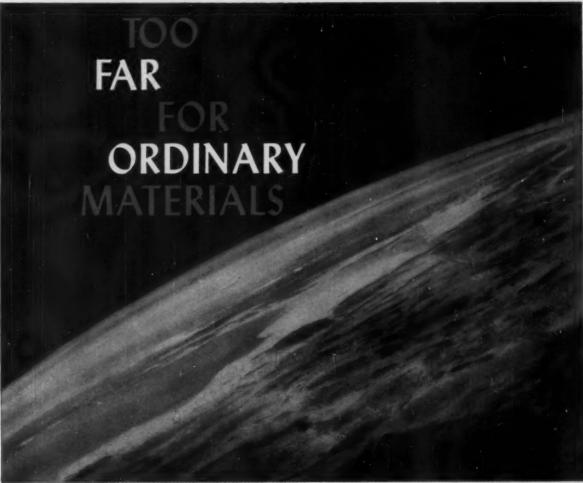






Edwin L. Wiegard Company

7503 Thomas Boulevard Pittsburgh 8, Pennsylvania



Official U.S. Navy photograph.

Versatile KEL-F fluorocarbons help solve complex design problems

KEL-F Fluorocarbon Products are a family of Molding Plastics, Plastic Dispersions, Oils, Waxes, Greases, Elastomers, Chemicals and Printing Inks.

Based on the extremely stable trifluorochloroethylene polymers, these fluorocarbon materials are engineered to withstand high temperatures and corrosive atmospheres. The entire KEL-F Fluorocarbon Family also possesses individual properties that make them indispensable in meeting a variety of the most rigid engineering specifications.

A Wide Variety Of Uses

The protection afforded by KEL-F Fluorocarbon Products is well established in the aviation field in a wide variety of applications. Included among these are acid and high-energy fuel hoses, seals, O-rings, diaphragms, coverings for micro-switches,

wire insulation, electronic components, laminated lined containers and compressor lubricants.

When your design problems involve elevated temperatures . . . corrosive fuels . . . vibrational shock . . . high humidity . . . aerodynamic loading —Kellogg is ready to help you find the answers. Write for further information.

The M. W. Kellogg Company, Chemical Manufacturing Division, Box 469, Jersey City 3, N. J.



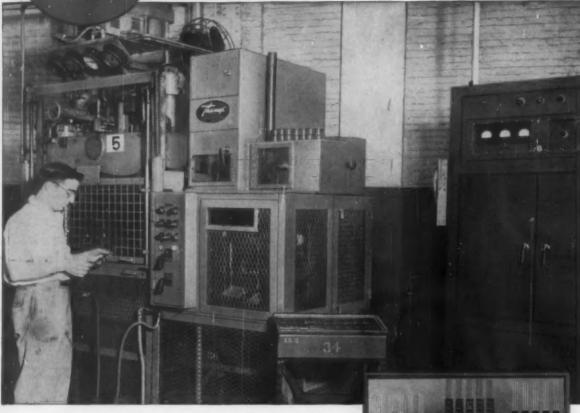
THE M. W. KELLOGG COMPANY

Subsidiary of Pullman Incorporated

® KEL-F is the registered trademark of The M. W. Kellogg Company for its fluorocarbon products.

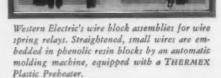


Helps Western Electric solve a molding problem with automation



PROGRESSIVE engineers of Western Electric's Hawthorne Works, Chicago, have developed an ingenious phenolic-resin molding process for their wire spring relay blocks. One of these automatic molding stations is shown at the left. Speeding output in each station is a THERMEX* Plastic Preheating Unit, its operating cycle integrated with feeding and molding. It preheats each preform an exact amount, aids uniformity of molding, reduces molding time.

This is typical of the profitable uses of molding automation, teamed up with THERMEX Plastic Preheaters. A THERMEX Engineer will gladly assist you in planning for low-cost molding of quality products. Call our nearest office. **THERMEX-Trade-Mark Reg. U. S. Pai. OR.



The GIRDLER Company A Division of National Cylinder Gas Company THERMEX DIVISION . LOUISVILLE 1, KENTUCKY

76 Beaver Street, New York 5, New York ° 133 South Clinton Avenue, Rochester 4, New York ° 505 Delaware Avenue, Butfalo 2, New York 239 Newton Avenue, Newark, Ohio ° 624 South Michigan Avenue, Chicago 23, Illinois ° 714 West Olympic Boulevard, Los Angeles, California.



Highly Loaded Asbestos Floor Tile

Special Low Mol. Wt.
Vinyl Copolymer Resin
100 parts
Phthalate Type Plasticizer
Chlorinated Hydrocarbon
Asbestos

Special Low Mol. Wt.
Vinyl Copolymer Resin
100 parts

This is a tough, hard, long-wearing stock with excellent dimensional stability. In it, the action of "Dutch Boy" Normasal is specific and unique... to prevent color changes from iron or other impurities present in the asbestos. "Dutch Boy" Tribase handles the high fluxing heat. Leadstar aids lubricity.

For heavy-duty tiles... use this highly-loaded "Dutch Boy" Stabilized vinyl stock*



Moderately Loaded Asbestos Floor Tile

Vinyl Copolymer Resin
Dioctyl Phthalate
Epoxy Plasticizer
Asbestos
Calcium Carbonate
100 parts
60 parts
60 parts
101 parts
102 parts
103 parts
1040 parts
105 parts
105 parts
106 parts
107 parts
108 parts
108 parts
108 parts
108 parts
109 parts
100 parts
10

A high gloss, resilient stock suitable for vivid coloring. As in the heavy-duty stock, Normasal prevents reactive color changes. "Dutch Boy" Clarite A teams up with "Dutch Boy" Calstar to provide heat and light stability plus lubricity.

For beauty-duty tiles... use this moderately-loaded "Dutch Boy" Stabilized vinyl stock*



Asbestos-free Floor or Wall Tile

 Vinyl Copolymer Resin
 100 parts
 "Dutch Boy" CLARITE A
 2 parts

 Dioctyl Phthalate
 35 parts
 "Dutch Boy" CALSTAR

 Epoxy Plasticizer
 5 parts
 0.50-0.75 parts

 Filler
 200 parts

This is a standard, asbestos-free stock with excellent flexibility suitable for walls and other light wear applications. "Dutch Boy" Clarite A and Calstar again team up to give this stock smooth processing characteristics and permit vivid coloring.

*Modify as called for by pigmenting requirements.

For light-duty tiles... use this asbestos-free "Dutch-Boy" Stabilized vinyl stock*

Outpace the flooring market on color with these 3 "Dutch Boy" Stabilized stocks

... one to build up and preserve color in each standard type of tile or cove molding

"Dutch Boy" Stabilizers do three things for color in highly filled vinyl flooring stocks.

First, they prevent color shifts caused by high processing heat. Second, they prevent changes in hue caused by sunlight and colorant reactivity with resin degradation products. Third, they broaden the range of color choice.

The formulations illustrated show how "Dutch Boy" Stabilizers combine to improve color in typical flooring stocks. For additional information, write National Lead's Technical staff.



NATIONAL LEAD COMPANY

111 Broadway, New York 6, N. Y.

In Canada: CANADIAN TITANIUM PIGMENTS LIMITED 630 Dorchester Street, West, Montreal Here's something new now made



Brilliant emblems made from metalized "Mylar" have been used on fast-flying jets for over two years. During this time, these emblems have been subjected to snow, rain, hail and even dust storms without being affected. This

remarkable resistance to the elements is made possible by the strength and abrasion resistance of "Mylar" which protects the aluminum particles—even in extremes of temperature and humidity.



"We have used nameplates made with 'Mylar' for over two years," reports the Toro Manufacturing Corp., Minnesota. The high abrasion resistance of 'Mylar' plus savings in cost compared to metal and hand painting were the big factors in Toro's choice of signs made with 'Mylar' for power mowers.



"Contrast between the metallic background and brilliant colors of our trade name provides us with an unusual eye-catching effect," reports Johnson Motors, Illinois. "Signs made from 'Mylar' provide a sizable cost saving—they're easy to apply...can stand up under all sorts of weather conditions."

in signs and nameplates with "MYLAR"



With the aid of metalized "Mylar"* polyester film, the printing industry has developed a "new look" in metallic signs for product identification, sales promotion and advertising. Already, hundreds of firms have added an extra dimension to the identification of their products or services by using lustrous signs and nameplates made with metalized "Mylar"...and with considerable cost savings!

What are the advantages of these new signs made with "Mylar"? Here are some of the high lights:

BRILLIANCE. Signs and nameplates, made by silk screening on metalized "Mylar", provide the high luster of newly struck metal signs. There's no need for polish because the metallic particles are completely pro-

tected from tarnishing by a sheet of "Mylar".

LONG LIFE. They're unaffected by moisture or harmful chemicals. Signs can give long years of rugged service while retaining their original luster.

STABILITY. Signs are dimensionally stable... unaffected by varying humidity and temperature changes between -80° and 300°F.

FLEXIBILITY. Because metalized "Mylar" is a tough, flexible material, these signs fit snugly to rounded or slightly irregular surfaces. Since most of these signs are backed with pressure-sensitive adhesives, there are no holes to drill—no screws or nuts to worry about.

EASE OF APPLICATION. Signs made

with metalized "Mylar" frequently cost less than other types. But the most significant savings are lower cost of application, absence of maintenance, and long-lasting luster.

There are a number of firms now equipped to print lustrous signs and nameplates on metalized "Mylar" in a variety of shapes and sizes . . . including die-cut designs. Fill out the coupon—we'll send our new fact-filled booklet on signs, plus names of printers now equipped to create the "new look" in signs made with "Mylar".



BETTER THINGS FOR BETTER LIVING

NOTE. Signs and nameplates shown on these pages were printed by conventional letterpress process. Since it is impossible to show the effect created by metalized "Mylar" when printing on standard magazine stock, we'll send you a sample sign, when you send in the coupon on the right.

*MYLAR is Du Pont's registered trademark for its brand of polyester film. In Canada, "Mylar" is sold by the Du Pont Company of Canada Limited, P.O. Box 660, Montreal, Quebec.

DU PONT	T L	at Canada and Silvania and Allanda and and	
M	YL,		7
The same and the same of the s	POLYES		

E. I. du Pont de Nemours	k Co. (Inc.), Film Dept.,
Room MP-2A, Nemours B	ldg., Wilmington 98, Del.
Please send me informa polyester film.	tion on signs and decats made with "Mylar"
Please send me your bo "Mylar" available.	oklet on properties, types and applications of
Application	
Name	
Firm	
Address	
City	State

"There are many reasons why we chose Dake Plastics Presses to mold glass reinforced decorative panels for the home and building industry. But none is more important than those that mean savings in production time. Dake automatic controls reduce the human error factor . . . make it possible to train operators in a matter of hours to become push-button molding specialists."

> -SAYS GENE SCHRAMM, PRESIDENT TerraStone, Inc., Franklin Park, Illinois (Suburb of Chicago)



A bank of three 50-ton capacity Dake Guided Platen Presses (above) used by TerraStone, Inc., Franklin Park, Illinois, to mold glass reinforced decorative panels.

JOB ENGINEERED TO MOLD REINFORCED PLASTICS



DAKE **PRESSES**

SPEED OUTPUT . . . REDUCE COST WITH THESE 7 FEATURES:

Guided Platen for accurate alignment. Control can be automatic, semiautomatic, or manual.

Fast Ram Approach speeds closing of movable platen which slows automatically as work is approached.

Pressure Adjustable from half to full press capacity.

Electric Timer holds pressure during curing cycle—adjustable from 12 sec to 63/3 min-after which ram returns automatically.

Capacities from 25 to 300 tons.

Heated Platens can be provided.

Write for Bulletin 340. and tell us your special requirements.



DAKE CORPORATION 648 Seventh St., Grand Haven, Mich.







Hand-Operated









Gap Type Presses



Movable Frame

Whether it's crash helmets or tote boxes key-tops or trays - drip pans or push buttons...



AMERICAN IS YOUR ANSWER

FOR PRECISION MADE PLASTIC PARTS

Whatever your industry or plastic part requirements, American's your answer. One of the nation's oldest and largest manufacturers of plastics, American offers facilities for injection, compression, extrusion, double-shot injection molding and low pressure and vacuum assisted molding. American's ultra-modern equipment can mold most types of plastics, including cellulose acetate and butyrate, polystyrene, acrylics,

reinforced fibreglass and copolymers. American's giant plant can handle every stage of manufacture from design to mass production. Regardless of whether your plastic problem is clear-cut or complex . . . regardless whether your needs are small or large, call upon American for the economical, quality answer. Write direct for further information today. Address Dept. AA



AMERICAN PLASTICS CORPORATION

A Subsidiary of Heyden Chemical Corporation EXECUTIVE OFFICES: 342 MADISON AVENUE, NEW YORK 17, N. Y.

Plastics Production Partner of America's Most Progressive Manufacturers





We have a house to put in order...

WE HAVE A HOUSE to put in order . . . and it's the house where America lives.

Of our country's many million homes, more than 1 out of every 10 are out-and-out slums. Nearly one-half of all American dwellings are in poor to "fair" condition, and urgently need basic repairs.

Something *must* be done-both to correct the slums of today and *prevent* the slums of tomorrow.

How do slums start? Usually just one house starts to slide downhill and soon a whole block changes. Pride is lost. Other houses are neglected, decay spreads.

So the 20 million homes in need of basic repair and improvements deserve equal attention. The time to stop the spreading blight of slums is *before it starts*.

What's your stake in stopping slums?

If you think your town is different, just look around you ... If you think slums only affect persons who live in them, think again.

Slums raise taxes and lower property values of the whole town. They raise rates of crime, delinquency and disease. Everyone has a real stake in stopping slums. And that includes you as a businessman.

Your firm is certainly dependent on the welfare of the community where you do business. But it's more than good business—it's good citizenship to take part in efforts aimed at civic improvements. It's the *responsibility* of every business.

What can your firm do? The answer to America's housing problems starts with individuals. But to roll back slums is such a big job it's going to take more than individual effort. It will need the cooperation of your business and many others.

Some slums should be torn down and a fresh start made. Others can be remodeled and made to conform to better living standards. So it is up to you to support every sound program which seeks adequate housing for all our people.

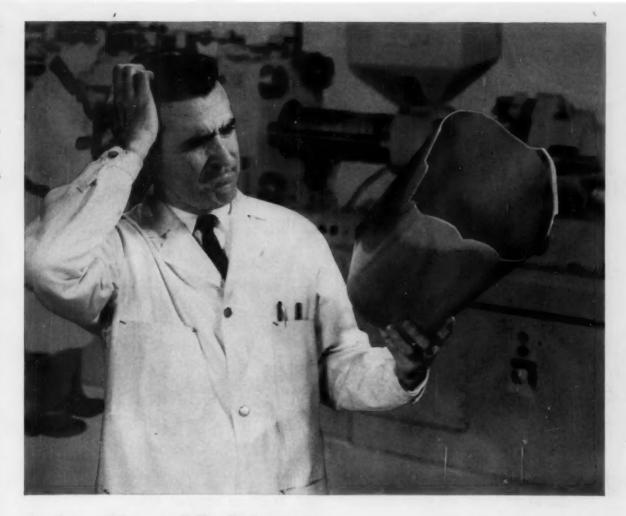
New help is now available

There is a new national, non-profit organization called A. C.T.I.O. N.—The American Council To Improve Our Neighborhoods—which is designed to help all individuals or groups interested in putting America's house in order.

Send for a free copy of "ACTION." It explains what A.C.T.I.O.N. is and proposes to do. It lists booklets, research, check-lists, and other material which can help you. Address P. O. Box 500, Radio City Station, New York 20, N. Y.



American Council To Improve Our Neighborhoods



Injection Molders: Are you using the wrong melt index?

Have you found the melt index that gives you both good flow characteristics and good "stress-cracking" resistance? Or are you plagued with production problems?

Now you can get the correct melt index resin. A-C POLY-ETHYLENE technical representatives can show you how to tailor-make the individual melt-index polymer that is exactly right for your product.

A blend of A-C POLYETHYLENE and the proper resin will enable you to get both good flow characteristics and good resistance to "stress-cracking." The use of A-C POLYETHYLENE results in these advantages, too: 1. lowered costs; 2. high gloss; 3. improved color dispersion;

AC Polyethylene

4. increased or equivalent stiffness; 5. reduced cycle time; 6. decreased injection pressures; 7. better mold release.

Mail in the coupon today for assistance in tailoring a melt-index resin to your operation.

SEMET-SOLVAY PETROCHEMICAL DIVISION

Allied Chemical & Dye Corporation Room No. 501-Y

40 Rector Street, New York 6, N. Y.

I want assistance in developing the correct melt-index resin.

Name

Address

___State_

FEBRUARY 1957

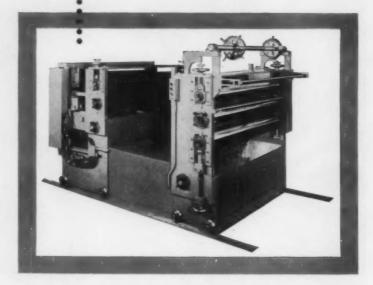
61

Robbins

creative thinking
plus
creative engineering
gives you the latest
in package sheet
haul-off equipment

ROBBINS HAUL-OFF UNIT AND SHEAR COMBINED ...

This newest ROBBINS Combination is being used for production of top quality sheet and laminating. This combination mounts on base rails and comes equipped with the rails and ball-bearing rollers for easy movement. Either or both bottom and top chrome rolls can be made adjustable. Laminating rolls can be set in most practical position For any specific operation. Sub-Base can be furnished with unit so that you can feed through the bottom and middle roll. Variable speeds on all units. Used with other ROBBINS individual units or special attachments, this latest ROB-BINS Combination has the flexibility to meet your requirements. Robbins dies and haul-off equipment can be used with practically all makes of extruders now on the market.



ANOTHER ROBBINS "FIRST"

- ★ The first with built-in self-contained air or hydraulic units for operation of shear.
- ★ The first with built-in temperature control units for heating of rolls.

Chrome Haul-Off Rolls—Rubber Pull Rolls
Traveling Automatic Shear—Automatic Scrap Cutting

Sheeting Dies • Stacking Units • Split Base Sheeting Units • Wind up Units • Profile Dies • Pipe Dies • Water Tanks • Pipe Pull-Offs • Pipe Coiling Machines • Automatic Cut-Off Saw Conveyors



PLASTIC MACHINERY CORP.

1430 MISHAWAKA STREET . . . ELKHART, INDIANA

Sheeting Dies A Specialty

For Thixotropy

IC-959 Thixo Polyester
A slightly thixotropic resin for hand lay-up on large structures.

For Fast Wetting

IC-937

Extremely fast wetting of glass fibers, fast gel time with uniform rate of cure. Contains activator.

For a Surfacing Resin

1C-934 Polyester Contains an activator.

For Fast Gel and Fast Cure

1C-766 Polyester Develops high strength rapidly.

For a Thickening Agent

IC-480 Thixogel Polyester To thicken other IC polyesters or for making a gel coat.

For Surface Color

IC Pigmented Gel Coats
Applied by spray to the mold surface to give a "molded-on finish."

For "Built-In" Color

IC Color Concentrates

For toning IC Colored Gel Coats and for pigmenting all IC Polyester Resins.

For a Mold Release Coating

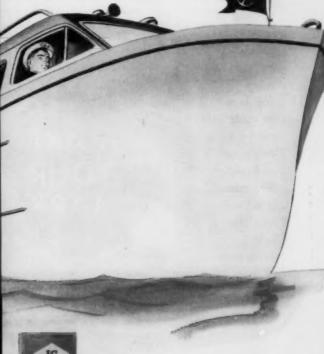
IC-500
Spray directly to the mold surface to prevent sticking.

If you manufacture boats, tanks, advertising displays, seats, or other objects of unusual size or shape, it's time to look into IC* Polyester Resins and Accessories for hand lay-up molding. Each IC product in this team is specifically formulated to work in harmony with the others for better results, whatever your individual needs may be.

Consult your nearest IC Polyester specialist for facts about specific hand lay-up fabrication problems, or write for the new IC Hand Lay-Up Bulletin.

Specify an © Complete Package of Companion Components

Hand Lay-Up Molding





Write for the new IC Hand Lay-Up Bulletin



Interchemical

Finishes Division

Commercial Resins Department

1754 Dana Avenue, Cincinnati 7, Ohio 224 McWhorter Street, Newark 5, New Jersey

Factories: Chicago, III. • Cincinnati, Ohio • Elizabeth, N.J. • Los Angeles, Cal. • Newark, N.J. • Mexico City, Mex.

In Canada, IC Polyester Resins are sold by Chemical Oil & Resin Company, Toronto, Ontario

*IC is a trademark of Interchemical Corp.



where work and play are combined-

PROFITABLY! Join these major business

firms who have come to this area in the past two years. Excellent opportunities await manufacturers of extruded and molded plastics who would serve existing and incoming industries. Substantial source of manpower, excellent schools, fine transportation, favorable tax structure, make this an ideal community for *your* employees to live, work and play where most people dream of retiring. Write today for detailed literature.

ST. PETERSBURG CHAMBER OF COMMERCE

Jack Bryan, Industrial Director

Dept. G

St. Petersburg, Florida





Small

Details

Escape the Contourmaster

Precise detail in molds need not be tied to high hand-finishing costs. CINCINNATI® Contourmaster Milling Machines faithfully reproduce die and mold contours right down to the smallest, most accurate detail. And they do this without close attention by the operator. Even less attention is required of a Contourmaster equipped with Duplex Rotary Table Attachment or Automatic Table Cycle. The machine then becomes an automatic die sinker. ¶ Dozens of Contourmaster features team up to reduce costs and improve quality of your tool and die work. The automatic depth control unit, illustrated below, is reason enough for you to choose a new Contourmaster for replacement or expansion. Would you like to have specifications? Look in Sweet's Machine Tool File, or write for a copy of our catalog No. M-1919.

THE CINCINNATI MILLING MACHINE CO.
CINCINNATI 9, OHIO

CINCINNATI

MILLING MACHINES - BROACHING MACHINES - CUTTER AND TOOL CRINDERS - METAL FORMING MACHINES HARDENING MACHINES - OPTICAL PROJECTION PROFILE GRINDERS - CUTTING FLUID - GRINDING WHEELS



Never



Intricate detail in this serving tray mold was milled on a CINCINNATI Contourmaster Milling Machine



Vertical profile of the master is accurately and automatically translated to the die block by the Automatic Hydraulic Depth Control unit.



DESIGN FOR

WEIGHT





LIGHT-WEIGHT BUCKET

molded of Thermaflow 100T glass reinforced polyester weighs only one-third as much as cast iron or steel—conveyors of the same horse-power can carry a bigger payload. Used for hauling powdered limestone, this bucket resists corrosion by strong acids and alkalis; cannot be damaged by vermin or bacteria. Molded by Quaker Rubber Co., Philadelphia, Pa., for Texas Supply Co., Townsend, Maryland.

SAVINGS

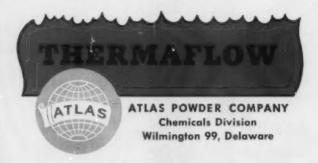
replace cast metal with molded polyester

You can save up to 65% in weight compared to iron or steel castings, by designing with Thermaflow reinforced polyester molding compounds. These materials are in the light weight metal range. Specific gravity is 1.8. Yet they give you rigid molded parts with far higher impact and flexural strength than other plastic compounds. In addition, they offer you—

- superior corrosion resistance
- excellent electrical properties
- good surface finish; no machining needed
- one-piece production—metal bushings and fittings can be molded in place
- variety of colors—no finishing needed; paint, if desired, without bonding coat

Thermaflow materials can be compression or transfer molded on standard presses at temperatures from 275 to 350° F., and pressures from 400 to 900 psi. They can be molded readily in large, complex shapes with deep draw and intricate detail. Curing time is relatively short.

Choose from many glass fiber and nylon rag reinforced grades. Write for literature describing materials, molding techniques and applications.





AN ANNOUNCEMENT OF IMPORTANCE TO ALL PLASTICS AND RUBBER MANUFACTURERS

U.S. Lexington N. North

Now York

BACTERIOSTATIC TESTS:

1671-91-A Plastic

1671-91-0

Ribbed.

Plastic.

Ribbed.

Plastic.

Ribbed.



ESTANLIMHED IMAS

IS NOW AVAILABLE FOR USE IN PLASTICS AND RUBBER PRODUCTS

BENDINER & SCHLESINGER ANALYTICAL AND BACTERIOLOGICAL LARORATORY
TRIBB AVENUE & TEXTE STREET

> Excellent. Excellent. Excellent.

Excellent.

Samples. (1)

U.S. Rubber Co.

Experimental

VINVI Test both sides.

Excellent.

Excellent.

For 25 years, Sanitized has been the approved bacteriostat for industrial use. The hygienic protection which Sanitized brings to America's freshness-loving millions has made it a unique and powerful sales stimulant for manufacturers and retailers. Now the marvelous advantages of the S. ... red process are available for plastics and rubber products.

- · non-toxic
- · retards odors
- · inhibits germ growth
- · resists mold and mildew
- · hygienically clean
- · assures lasting freshness
- · antiseptically clean
- · laboratory approved

Sanitized chemists and engineers are ready to work with plastics and rubber processors and manufacturers on individual requirements. Sanitized is nationally advertised and featured by 40,000 retailers. We invite your inquiries.

AGAR PLATE METHOD:

O.1 cc of 24 hour culture of standard strain of Micrococcus var. aureus (Staphylococcus aureus) and Standard F.D.A. agar; at 37° C. for 24 hours.

BACTERIOSTATIC TESTS:

Plastic side. Excellent.

Ribbed side, Excellent.

RESULT Excellent.

HALO 6 mm. halo,

BACTERIOSTATIC TESTS:

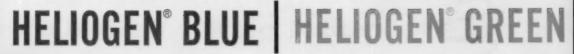
For information write, call, or wire PLASTICS AND RUBBER DIVISION

RESULT White rubber sheet. Excellent. Rubber, yellow. Excellent.

HALO 5 to 6 mm. halo. About 2 mm. halo.

SANITIZED SALES COMPANY OF AMERICA, INC.

181 Madison Avenue, New York 16, New York . MUrray Hill 4-1253



lightfast
chemically resistant pigments
for plastics
paints
printing inks

UNEQUALLED FOR-

brilliance of shade - fastness to light - tinctorial value

A FORM FOR EVERY USE:

POWDERS (Water Dispersible): non-dusting-electrolyte free

POWDERS (Resinated): soft grinding—high transparency

POWDERS (Toners): superior strength and ease of grinding

PASTES: uniformly fine pigment particles, well dispersed

PRESSCAKES: superior flushability

Heliogen phthalocyanine pigments have outstanding fastness to light, acids, alkalis, aliphatic hydrocarbons, alcohols, ketones, esters, turpentines, varnishes, and vegetable and mineral oils. Noncrystallizing Heliogen pigments are available for use with aromatic solvents.

There is a form of Heliogen pigment with the specific physical properties for your use. Please write for specification booklet or consult our Technical Department or nearest sales office.

from Research to Reality



GENERAL DYESTUFF COMPANY

GENERAL ANILINE & FILM CORPORATION
435 HUDSON STREET . NEW YORK 14. NEW YORK

GOSTON : CHARLOTTE . CHATTAMOGGA . CHICAGO . LOS ANGELES . NEW YORK . PHILADELPHIA . PORTLAND, ORE. . PROVIDENCE . SAN PRANCISCO . IN CAMADA: CHENICAL DEVELOPMENTS OF CAMADA, LIP., MONTREAL

Malianes microsets manufactured by the General Aniline and Film Conservation are sold extends the United States under the trademork "Females."

MINI-JECTOR

TRADE MARK

PLASTIC INJECTION MOLDING MACHINES

YOUR SMALL CAPACITY (1/3 oz. to 1 oz.) INJECTION MOLDING PROBLEMS

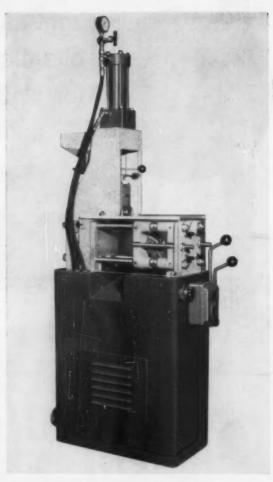
Here are the small thermoplastic injection molding machines that do a small job in a big way! Economical to operate and low in cost, these up to 1 ounce plastic injection molding machines are turning out thousands of small plastic items every day for hundreds of satisfied users. Molds any thermoplastic . . . including Nylon. The Mini-Jectors are the most versatile machines in their class. Simple and compact in design, Mini-Jectors operate easily and efficiently and owners everywhere find they pay for themselves many times over.



MODEL 45 "WASP" ¾ oz. capacity air-operated Mini-Jector . . . fast and economical. 6" air cylinder operates rom . . . 40 to 150 pounds of air pressure required depending on type of plastic used and product being molded. Material hopper capacity 4 pounds.



MODEL 50 "WASP" a new Mini-Jector . . . capacity 1/3 oz. to 1 OUNCE at pressures up to 30,000 PS1. This is an ideal model for precision insert work with any type of plastic. Hydraulically operated.



MODEL 60-PC 75 "HORNET" POWER OPERATED LEVER CONTROLLED. Mold size $6" \times 5" \times 51/8"$

This model retains all of the time-tested features of our popular 60-HC75 with the added feature of hydraulically operated, lever controlled mold opening and closing for faster, easier production. Like all Mini-Jectors the 60-PC75 gives you the most economical way of injection molding articles in the capacity range of $\frac{1}{3}$ oz. to 1 oz., where modest scale production is required.

EVERY DAY THOUSANDS OF ITEMS ARE BEING PRODUCED PROFITABLY ON MINI-JECTORS

WRITE TODAY . . . for literature telling how Mini-Jector may help solve your injection molding problems, to . . .

NEWBURY INDUSTRIES, Route 87, Newbury, Ohio

"Specializing in the Production and Development of Plastic Injection Molding Machines up to one ounce capacity."



EXON 468...the easy way to make FLOORING finer...and faster!

Typical of the Pin-Pointed Properties in Exon vinyl resins



Specifically made for flooring, Exon 468 vinyl resin is another dramatic demonstration of the unusual benefits to all industries in the "Pin-Pointed Properties" of Firestone Exon resins.

Exon 468 has been specifically formulated for makers of vinyl abbestos floor tile. Substantial production savings make it the wise choice . . . with its higher bulking density, it increases

mixer output 10 to 25%. Processing is easier, since Exon 468 is engineered to permit rapid fusion.

Compounds made of Exon 468 are less affected by heat and light. They hold pigmentation and stabilizing ingredients exceptionally well.

Let Firestone engineers pin-point resin properties to solve your specific needs. Call or write today:

CHEMICAL SALES DIVISION

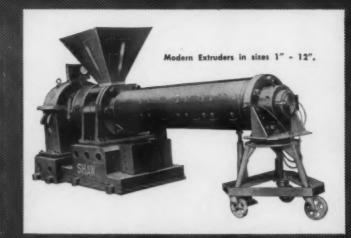
FIRESTONE PLASTICS CO., DEPT. 72D. POTTSTOWN PA. . A DIVISION OF THE FIRESTONE TIRE & RUBBER CO.

INDUSTRY'S MOST COMPLETE LINE OF VINYLS ENGINEERED TO YOUR SPECIFIC NEEDS

quality extrusions through controlled temperature zones

To produce quality extrusions without the risk of imperfection requires temperature control to a fine degree. These Shaw Extruders provide it exactly. There is all electric heating in separate zones and each zone is independently controlled by proportioning instruments.

Various screw and die designs are available for the production of piping, sheeting, miscellaneous sections, and the insulation and sheathing of cables, etc. Great attention has been paid to bearings and barrel support to avoid wear and vibration.



We also manufacture

EXTRUDERS, MIXING MILLS.
ROTACURE MACHINES, TYRE
BUILDING MACHINERY,
LABORATORY EQUIPMENT
FOR RUBBER AND PLASTICS,
PRESSES, ETC.

- variable speed drive
- · special long screw to suit materials used
- · screw speed indicator
- all electric heating in separate zones
- proportioning temperature control
- · water cooled screw and feed box
- full temperature indication
- · supported barrel end and transportable die heads

SHAW

EXTRUDERS

FRANCIS SHAW & COLTD MANCHESTER 11 ENGLAND
Telephone: EAST 1415 8 Telegrams: Galender Manchester
FRANCIS SHAW (CANADA) LTD GRAHAMS LANE BURLINGTON ONTARIO CANADA



why key parts are molded from Gering's thoroughly compounded formulations!

They're long-lasting, eye-catching, durable beauties for the youngest post-diaper set ... and there's a mighty good reason why Gering polyethylene formulations went into production of these toys!

For the molder gains much more than sure color matching and dependable quality. Gering custom compounded polyethylene gives the molder faster production cycles, easier mold release, less rejects... all adding up to low costs for high quality jobs.

Gering custom compounds all thermoplastics for extrusion and injection molding... special or standard formulations, varied colors and special effects. All developed to your needs by Gering technicians... delivered to your shop ready to mold!

Why not get all the facts on Gering custom compounding service in time to start boosting profits on your next quality molding job! Write today for full information.



PRODUCTS INC.

KENILWORTH, N. J.



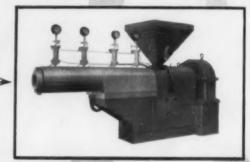
Pioneers in modern plastics for over 30 years!

Egan Extruders

with "WILLERT
VAPOR PRESSURE COOLING"*

PRODUCE

Close Tolerance
Extrusions
EASIER AND FASTER!



ACTUAL MATERIAL TEMPERATURE

Indicated and recorded during a typical day's production run—not a carefully controlled laboratory test.

Egan extruders are the only extruders available with an automatic temperature balancing system which also provides a quick cooling feature—without pumps, blowers, or compressors.

"Patent applied for

FRANK W. EGAN & COMPANY, Somerville, New Jersey

PRANK W. EGAN & COMPANY, Somerville, New Jersey
Designers and Builders of Machinery for the Paper, Converting and Plastics Industries
Cable Materia, "Ganco", Supervise New.

Representative: MEXICO, D. F. — M. H. Gottfried, Avenida 16 De Septiembre, No. 10. Licensees: GREAT BRITAIN — Bone Bros. Ltd., Wembley, Middlesex. FRANCE — Achard-Picard, Remy & Cie, 36 Rue d'Enghien Xe, Paris. ITALY — Emanuel & Ing. Leo Campagnamo, Via Borromei 1 8/7, Milano. GERMANY — ER-WE-PA, Erirath, bel Dusselderf.

Latest Tests Show "Poly-Eth" Makes BEST Pipe!



Excellent processing qualities of test-winning new "Poly-Eth" 3405 make it faster and easier to handle, give a high gloss finish to pipe.

RECENT scientific tests, conducted by a major American pipe manufacturer, and reported in the four pictures below, demonstrate that new "Poly-Eth" 3405 has a balance of properties which make it superior to any other commercially available polyethylene pipe resin. New "Poly-Eth" 3405 has the highest density of any high-pressure-produced polyethylene pipe resin now on the market. Special production techniques give it unusually high yield strength, making for unusually high burst and creep resistance.



(1) Step by step, pressure is increased in this "slow-burst" test until the pipe bursts. Five seconds before bursting at the 4th step or "increment" (251 psig) is par for the course. Pipe made of "Poly-Eth" 3405 (left) lasted 1½ minutes at the 6th increment (351 psig)—surpassing all competition!



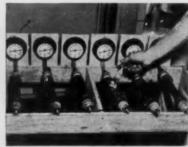
(2) At 50 psi above expectancy (950 psi), 3405 passed the "Creep Service Life Test," where pipe is subjected to a stress level of 900 psi for 100 hrs. at a temperature of 113° F. This test measures the tendency of a plastic pipe to cold flow or stretch circumferentially over a long period of time.



Greatly increased yield strength is a major asset of new premium "PolyEth" 3405. In Spencer lab tests, 3405 surpassed older-type polyethylene yield strengths by 40%; surpassed nearest present competitor by 20%. For more information about recordbreaking new "Poly-Eth" 3405, write to Spencer Chemical Co., Dwight Building, Kansas City 5, Missouri.



(3) In the "Quick-Burst" Test, comparing "Poly-Eth" with competitive brands, Spencer "Poly-Eth" 3405 stood up under pressures over 60% above specifications. This dramatic demonstration means an added safety factor and greater durability for pipe made of this new "Poly-Eth" resin.



(4) For the stress crack test, samples of 1" pipe made of Spencer "Poly-Eth" 3405 were pressurized to 169 psig—twice the normal working pressure. Then the pipe samples were coated with a stress cracking agent. NO failures were observed in any of the specimens after a full week.



SPENCER CHEMICAL COMPANY Dwight Bldg., Kansas City 5, Mo. Now-At Last ...

MASSIVE NYLON MOLDINGS

Now with New Spencer Nylon
you can injection-mold big
void-free pieces that are
LIGHTWEIGHT
DURABLE AS METAL
CORROSION RESISTANT



Giant vs. Dwarfs! Photo shows nylon moldings of conventional size, compared to the huge sizes now possible with new Spencer Nylon. Combining metal-durability with plastic-lightness, these big new injection-moldings can be price-competitive with metal.

A new kind of nylon now makes it possible to produce injection molded pieces weighing pounds instead of ounces. This means you can make nylon pieces with larger surface areas and thicker cross-sections than ever before possible. This development is of major significance to the plastics industry, for it brings into range such multi-million-pound targets as cases for portable radios, motor boat propellers, conveyor belt links, electric motor housings, and other large items made of metal.

Such massive moldings have long been needed, for nylon combines the durability of metal with the feather-lightness of plastics. In properly designed applications where friction is involved, nylon works better than metal, for it is self-lubricating and abrasion-resistant.

Nylon often offers real economy in the cost of finished pieces. As compared with metal, its low specific gravity permits the production of more parts per pound. Manufacturing cost is cut by molding to close tolerances, rather than machine finishing. Thus, despite nylon's relatively high cost per pound, it is frequently possible to produce nylon parts at a substantially lower cost than metal.

But until recently, it has been impossible to supply these profitable big-piece moldings. At molding temperature ordinary nylon is highly fluid, making it difficult to handle. And because it solidifies so quickly, large void-free moldings have been hard to produce.

New Spencer Nylon corrects these faults. Because it has a working range of nearly 100° F., it's easier and safer to handle, and less likely to degrade during molding. Because it has a greater plasticizing range, it sets up more slowly and, to a high degree, prevents voids.

Besides being light and strong, the resulting moldings—unlike metal—are non-corrosive. Contrasted with polyethylene, nylon is unaffected by hydrocarbons, and can be used for applications involving gasoline, oils, fats and turpentine. Its excellent heat resistance permits nylon to be used where steam sterilization is required. And Spencer Nylon offers the most highly controlled specifications of any nylon available today, because it is manufactured by continuous polymerization instead of by the old-fashioned "batch" process.

A multi-million pound plant, now under construction in Henderson, Kentucky, will soon be ready to supply you with Spencer Nylon. To meet existing demands, Spencer is ready NOW to bring you AKU-manufactured shipments of this same superior nylon in eight grades. Write to Spencer Nylon, Spencer Chemical Co., Dwight Building, Kansas City 5, Missouri.

NOW! NYLON by SPENCER (SPEN

SPENCER CHEMICAL COMPANY

GENERAL OFFICES: DWIGHT BUILDING, KANSAS CITY 5, MISSOURI

look... it's TITANOX' Rutile types of TITANOX white titanium dioxide pigments are universally acceptable for most types of plastics—whether extruded, molded, sheet, or film-coated. For white and light tinted stocks, TITANOX-RA provides maximum whiteness, brightness and opacity. For heavily loaded stocks where the high opacity of "pure" titanium dioxide is not needed, TITANOX-RCHT or TITANOX-C-50 may be used.

But whatever the use, no other whitening agent gives plastic products the color and sparkle—the eye-catching appearance—that TITANOX does. Titanium Pigment Corporation, 111 Broadway, New York 6, N. Y.; Atlanta 5; Boston 6; Chicago 3; Cleveland 15; Houston 2; Los Angeles 22; Philadelphia 3; Pittsburgh 12; Portland 14, Ore.; San Francisco 7. In Canada: Canadian Titanium Pigments Limited, Montreal 2; Toronto 1.





TOPS...

and popular all around



The visors for the Decor and the DeVille Hair Dryers are molded for RAYETTE INC., ST. PAUL 1, MINN.

The pleasing clover pink color of the heavy injection molded visors (24-oz. and 21-oz.) plus the perfect clearness which enables the patron to look around, eliminates that hemmed in feeling often caused by the old-fashioned hair dryers.

The beauty and durability of acrylic plastic has long been recognized but it takes exceptional care and close control to hold the top standard necessary to combine these two features.

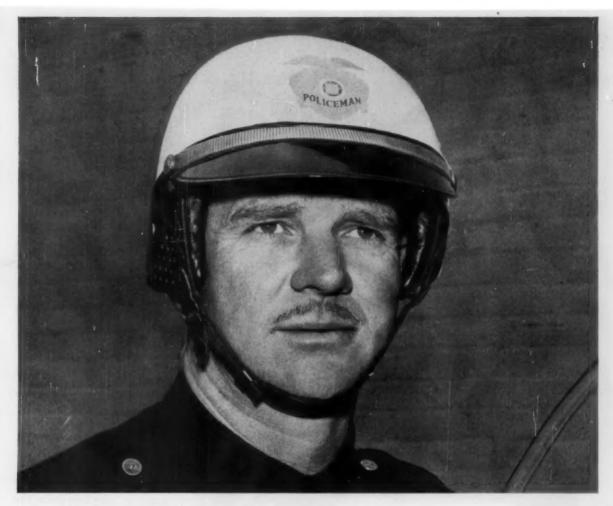
Minnesota Plastics with the best of equipment, excellent quality control and backed by years of experience in all types of industrial molding did the job to the complete satisfaction of the customer.

We'd like the opportunity of working out your problems—we are as near as your phone and most willing to be of service.

Send for our facilities brochure.

MINNESOTA PLASTICS CORPORATION





Police helmets are stronger because:

Garan® Roving wets out faster...gives more uniform fiber distribution

Mr. Kramer says, "The helmet preforms we make for Protection, Inc., of Los Angeles, are made from L·O·F Glass Fibers' roving with Garan sizing. Final molding is made with polyester resin in matched metal dies."

L'O'F Glass Fibers' Garan roving is ideal for preforming, molding, rod stock, mat and woven roving applications. Because of its superior wetting-out properties, it produces a better bond between resin and reinforcement.

This means you will have a product that retains its strength, even after prolonged exposure. What's more, because Garan roving wets out faster, it gives reinforced plastics better physical properties—both wet and dry—than most other reinforcing materials.

For complete details about types and applications for Garan, Vitron or Chrome roving, write: $L \cdot O \cdot F$ Glass Fibers Company, Dept. 15-27, 1810 Madison Avenue, Toledo 1, Ohio.



J. A. Kramer, President, Plastic Age Company, San Fernando, Calif., molder of shells for Toptex Police Helmets.



L'O'F GLASS FIBERS COMPANY . TOLEDO 1, OHIO

COLOR UNIFORMITY DESIRED ... ABSOLUTE



CLAREMONT

-the preferred source for a complete range of

■ Calibrated Color Concentrates for coloring:

Polyethylene

Calibrated color pastes
for coloring:
Vinyl Plastisols
Vinyl Film & Sheeting
Epoxy Resins
Polyester Resins

Gravure and
Valley Inks for
printing
du Pont Mylar
Polyethylene
Vinyl

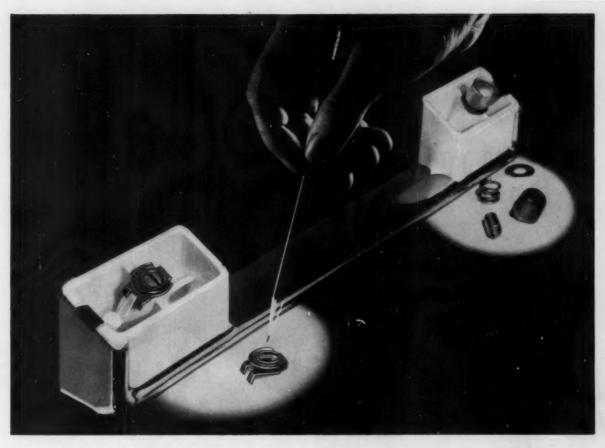
Ink formulations for Gravure
and flexographic printing
on all plastics.
Full color range
including metallics.

CLAREMONT

pigment dispersion corp. 39 powerhouse road roslyn heights, l. i.



Write for technical bulletins on products of interest to you



Engineered by Tinnerman...

One-Piece SPEED CLIP® replaces 4-part fastener, helps assembly and shipping... and saves money!



Four separate parts plus screw were required to fasten each end of the removable door handles on kitchen ranges manufactured by the Caloric Appliance Corporation, Topton, Pennsylvania.

Tinnerman fastening specialists teamed up with Caloric designers to eliminate 3 of the parts!

Now . . . a special one-piece, multi-purpose Speed Clip plus screw do the same job more efficiently and at lower cost, and reduce small parts handling. Faster, easier assembly . . . fewer parts to buy, inventory and handle. Packed

inside the oven for safe shipment with Speed Clips in place, the door handles are dealer-applied in far less time, can be easily removed by the housewife for cleaning.

The resiliency of the spring steel Speed Clip prevents crazing or chipping, enables it to absorb varying panel thicknesses and porcelain enamel build-up. Changeover was made without retooling or redesigning door handle or keyhole-shape mounting holes.

Find out now where Speed Nut brand fasteners belong on your assembly line. There are more than 8000 variations to choose from. Call your Tinnerman representative for complete details and write for our Fastening Analysis Bulletin No. 336.

TINNERMAN PRODUCTS, INC. . Box 6688, Dept. 12, Cleveland 1, Ohio

Canada: Dominion Fasteners, Limited, Hamilton, Ontario. Great Britain: Simmonds Aerocessories, Limited, Treforest, Wales. France: Simmonds, S. A., 3 rue Salomon de Rothschild, Suresnes (Seine). Germany: Hans Sickinger GmbH "MECANO", Lemgo-i-Lippe.

TINNERMAN

Speed Nuts FASTENINGS





PERMANENCE...

the big reason why





It will pay you to investigate Plastolein 9720 Polymeric because it provides the extreme permanence and durability so vital to the life of your vinyl flooring. This results primarily from 9720's outstanding performance relating to such factors as dimensional stability, heat and light stability, volatility, and extraction.

Plastolein 9720 also offers these cost reducing advantages: low plasticizer cost, relatively high efficiency, low filler absorp-

tion, and the efficiencies of easy processing. Also, though 9720 is a polymeric, its relatively low viscosity permits the economies of bulk shipping and handling.

With all these advantages, why not try Plastolein 9720 in your vinyl tile formulations—or in any formulation where permanence is essential.

For complete details on 9720 or any of the Plastolein Plasticizers, mail coupon below:

Emery Industries, Inc., Co

Organic Chemical Sales Department

Carew Tower, Cincinnati 2, Ohio

Emery Industries, Inc., Dept. F-2, Carew Tower, Cincinnati 2, Ohio

Please send 32-page Emeryfacts describing all the Plastolein Plasticizers.

| Company.....

Address

.....State.....



What's happening in resins for reinforced plastics

Details of recent technical and commercial developments, especially in phenolics, polyesters, and epoxies

By Irving Skeist*

Reinforced plastics are fibers bonded together with resins. The fibers provide most of the strength, but if this strength is to be realized the resins must adhere uniformly to the fibers, leaving no voids. The important fiberbonding resins of today are the polyesters, phenolics, and epoxies, aided by the amino resins and silicones. All are thermosets.

It was not always thus. We are told that the infant Moses, an early fancier of reinforced plastic boats, sailed the Nile in a basket sealed with pitch. Water resistance was the key property, and this thermoplastic had it.

Today, however, five other properties are expected of a resin: 1) hardness, 2) rigidity, 3) high softening temperature, 4) solvent resistance, and 5) good adhesion to the fibers. The first four of these properties are characteristic of thermoset resins, which are cross-linked. The more numerous the cross-links, the higher are the modulus, strength at elevated temperature, and resistance to chemicals.

The fifth property—adhesion to the fiber—could be attained with thermoplastics as well as thermosets. Even here, however, the cur-



*Dir., Skeist Laboratories, Chemical Consultants, 89 Lincoln Park, Newark 5, N. J. Based on a paper to be given at the 12th Reinforced Plastics Symposium of S.P.I. Chicago, Feb. 1957.

> Curis of ceder wood embedded in reinforced plastics provide decorative effect on wall in rear and screen at left. (Photo, U. S. Rubber)



Over 35 tons of polyester resin were used for pile bonding in construction of world's largest highway bridge, spanning 24 miles of Lake Pontchartrain. (Photo, Celanese)



Laundry extractor has several reinforced plastics parts, including cover and lower tub. (Photo, Bock Laundry Machine Co.)

able resins excel. The epoxies and phenolics have high specific adhesion to glass as well as vegetable fibers, which adhesion is further enhanced by suitable fiber finishes.

The polyesters and epoxies are available in the form of liquid intermediates with sufficient fluidity to wet the fiber and adhere to it, yet they are curable in fast cycles without evolution of volatiles. The phenolics are the original reinforceable resins and were long ago successfully strengthened by cellulose fibers in one form or another. They have seen hard times, but have shown a knack for getting back into the spotlight. High heat resistance and high modulus, both much in demand for supersonic aircraft, for missiles and for other purposes, have given new impetus to reinforced phenolics.

About the polyesters, on the other hand, there seems to be a feeling among a minority of producers that further growth of these plastics will depend principally upon cheaper production techniques such as premix molding. The Lightweight and sturdy reinforced plastics are ideal for trays and tray carriers aboard commercial airplanes. (Photo, U. S. Rubber)





Life-size model of whale, molded of sisal- and glass-reinforced polyester resin, makes exciting new playground facility. (Photo, Bakelite Co.)

resins themselves are good enough, they say; no sense throwing more money down the laboratory drain by conducting research on the base resins.

One obstacle to larger research budgets is that any significant improvement in one company's polyesters can be analyzed and probably copied with impunity by any other resin producer. Patent protection is already hard to come by. It has been suggested many times that perhaps the resin producers could best adjust to this situation by sponsoring research on an industry-wide basis.

In epoxies, such an industry-wide patent pool is invigorating all participants. Shell, Bakelite, Ciba, and Jones-Dabney are splashing about merrily in this pool, while Borden and Reichhold are dunking their toes and Dow stands poised for the plunge. The liquid epoxies cost more than twice as much as most polyesters, yet they are rapidly gaining acceptance in reinforced plastics on the basis of superior properties. Their big advantage is low shrinkage on

polymerization, bringing with it improved adhesion to glass and better water resistance. And polyester resin makers cannot afford to be smug about the epoxies' high cost. This, too, may pass, carbide researchers hope.

With this background, these three groups of resins may be examined in more detail.

Phenolics

Fifty years after their inception, the phenolics are still rewarding the faithful who invested in research and development. At about the same time that Dr. Baekeland was building the foundation for the synthetic resin industry, the first airplanes were probing the mysteries of flight. Today the airplane has broken through the sound barrier, and phenolics give hope of piercing the heat barrier. The phenolics, more than any other plastic, combine high heat resistance with rigidity and good adhesion to reinforcing agents. While Air Force people are not yet wholly satisfied, phenolic-bonded asbestos or glass cloth comes close to meeting their needs

MODERIT FURS



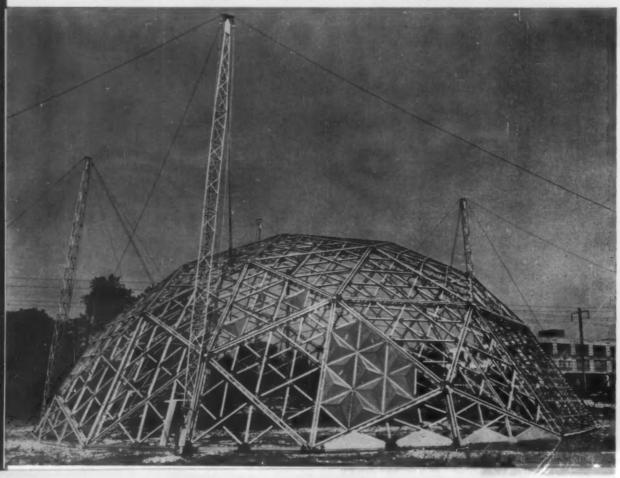
Radar antenna reflector, molded of glass cloth-reinforced epoxy skins and aluminum honeycomb core, weighs ½ less than metal reflector. (Photo, Shell)

for structural members of supersonic aircraft.

Several factors account for the improvement in high-temperature performance. First, the fiber is pretreated with an agent designed to improve the adhesion of glass to phenolic. One such agent, developed by the Ordnance Laboratory, is a reaction product of allyl trichlorosilane with resorcinol. The bonding resin, applied to the treated fiber from solution, is a one-step phenolic, but contains less formaldehyde than is customary in a resole. Improved adhesion, higher proportion of aromatic constituents, and high density of cross-links all contribute to better heat resistance.

Curing cycles depend on resin formulation: Barrett recommends a 16- to 18-hr. post cure at 350 to 360° F., at high pressure, followed by a gradual temperature increase of 15° F./hr. from 350 to 600° F. for Plaskon laminating varnish V-204. Bakelite suggests that its BLL-3085 and BLSA-3005, new high-temperature-strength phenolics, can be cured satisfactorily in a 5-min.

Geodesic dome, 117 ft. across at the base and 46 ft. high, will be covered by pyramidshaped glass-reinforced polyester panels, some of which are shown in place. (Photo, Durez)



pass through an oven at 260 to 270° F. A small amount of "hexa" (hexamethylenetetramine) is employed as catalyst.

Polyesters

Recent developments in polyester resins are primarily commercial rather than chemical. The growing use of premixes and molding powders has emphasized resins adapted to these uses. The need for flame resistance in building applications has given HET (hexachloroendomethylenetetraphthalic) acid a boost. Price drops encourage wider use of styrene, methyl methacrylate, itaconic acid. For heat resistance, resin makers are turning to triallyl cyanurate, to Carbic or Nadic hydride, and to diols derived from bisphenol A, along with HET.

A polyester resin is made from glycols, acids, and monomers. Acid and diol are combined to form an unsaturated alkyd which is then cross-linked with monomer. The acid component is usually a mixture of unsaturated acids (or an-

hydrides), to provide reactivity with the monomer later on, and saturated acids, to rodify the properties or lower the cost. Interest today is centered on the monomers and saturated acids, but some developments are taking place in the other categories also.

Glycols: Four glycols predominate in unsaturated polyesters: ethylene glycol (EG), propylene glycol (PG), diethylene glycol (DEG), and dipropylene glycol (DPG). The choice of glycol is a complex one and depends on:

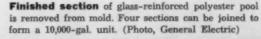
1) Compatibility with styrene. The glycols with methyl side chains, PG and DPG, are best.

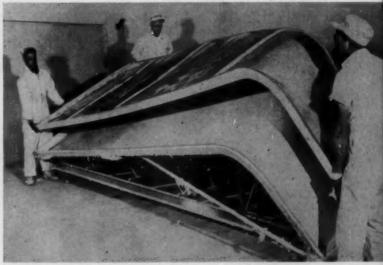
Water resistance. PG is best. This, coupled with its styrene compatibility, makes PG the most widely used of the glycols.

3) Cost. The monoglycols, EG and PG, are cheaper as glycols, but the diglycols lose a lower proportion of their weight as water during esterification, and also make a greater proportional contribution to lowering the finished resin cost when used in combination with the



Building panel is made of paper honeycomb core and polyester skins, using 100% solids, room-temperature curing adhesive. (Photo, Rubber and Asbestos)



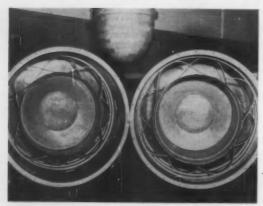


more expensive acids; hence DPG and DEG make for the least costly product.

4) Reactivity. PG and DPG are somewhat slower to esterify than EG and DEG, because of the secondary hydroxyls in the former.

Flexibility. The diglycols, DPG and DEG, offer structural flexibility at lowest cost.

The higher members of the PG series may find usage in unsaturated alkyds when they are readily available at a low price. But the verylong-chain saturated diols used in urethane foam manufacture are not of interest for unsaturated alkyds, as it would be impossible to attain an uncured resin having both adequate



Inside view of shockproof container halves, showing glass-polyester sinusoidal springs that protect contents. (Photo, Shell)

Fuselage of Taylorcraft Ranch Wagon airplane, made of fibrous glass-polyester resin laminate, remained intact after crash. (Photo, Durez)



unsaturation and low enough viscosity. A diol made by reacting bisphenol A with propylene glycol is said to be in use by two manufacturers for the synthesis of polyesters having unusual chemical resistance as well as high softening temperatures. Here again, the aromatic ring is the key to good heat resistance.

The longer straight-chain glycols such as pentane diol are prohibitive in price. Should this situation be changed (by a minor miracle), these materials will be much in demand as flexibilizing components. Unsaturated diols are not available at moderate prices, and probably would not polymerize satisfactorily, anyhow.

Unsaturated acids: Maleic anhydride and fumaric acid are the favored unsaturated components of alkyds for reinforced plastics, with maleic predominating. The fumaric gives better end properties, but is more costly on a molar basis. Nothing is lost in the esterification of maleic anhydride, whereas a mol of water is removed when fumaric acid becomes an ester. Reactivity with glycols and solubility also favor the maleic anhydride.

If the maleic anhydride combined with the glycol to form only glycol maleate, it would be impossible to use styrene as monomer: the maleate groups would not polymerize appreciably with this more reactive material. Fortunately, if the esterification is carried out properly, most of the maleic molecules do a flip-flop—in chemical language, they isomerize—and thus the polyester is predominantly fumarate rather than maleate. The fumarate groups do combine with styrene. If the monomer is styrene, or a styrene-methyl methacrylate mixture, the maleate groups in the alkyd probably do not react. But, even the maleate groups could polymerize with diallyl phthalate.

The difference between maleic-derived and fumaric-derived polyesters shows up in heat distortion point, which is several degrees higher for the fumaric. This advantage in reactivity points to fumaric for applications requiring fastest cure and best resistance to heat, solvents, and light degradation.

The only other unsaturated dibasic acid on the polyester horizon is itaconic acid. Itaconic polyesters are even more reactive than fumaric. Pfizer, producer of both, has recently cut the price of technical itaconic; but it is still too costly and is too readily polymerized and difficult to inhibit for most polyester end-uses.

An important feature of the itaconate polyesters is that they can be cured without addition of monomer. The technolo- (*To page 207*)



Reinforced melamine

Salt bowl for cattle

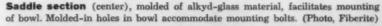
Colorful bowl molded of cotton-filled melamine serves as handy receptacle for loose salt fed to cattle. (Photo, Morton Salt)

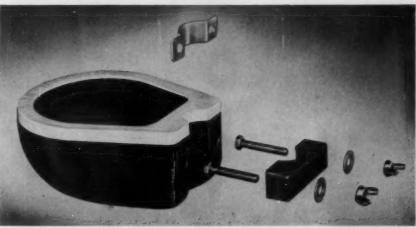
Reinforced melamine molding compounds have taken on and successfully solved the task of updating "primitive" methods for feeding salt to cattle. For years, the "lick-sticks" used by farmers to provide cows with their necessary salt complement have been in the form of salt blocks or bricks in burlap bags or cardboard boxes, hung on the barn wall or placed on the floor where the cattle can reach them.

Now comes an attractive, lightweight melamine salt bowl that does away with the annoying problems of maintenance and waste associ-

ated with the old-fashioned bag or box "licksticks." As designed by Morton Salt Co., Chicago, Ill., and offered by that company as a premium with the purchase of its salt, the chipproof bowl can be mounted on stanchion or wall at trough level within convenient reach of the cattle and can be filled with the more economical loose salt instead of the blocks or bricks.

The unit is molded of macerated cotton-filled melamine in two pieces—the deep blue bowl (about 6 in. deep and about 9 in. in diameter) and the flat rim in contrasting (To page 222)





Potted splices in electrical power cables

are completed by casting epoxy resin in expendable plastic molds

Self-curing epoxy resins, cast in expendable plastic molds, are the basis of kits recently developed by Minnesota Mining & Mfg. Co. for insulating splices in electrical cables. With these "Scotchcast" kits, splices having superior protection against electrical breakdown and moisture penetration can be quickly made.

Key to the convenience of the 3M splice-insulating method is the use of specially formulated epoxy resins which harden rapidly without application of heat. In order to make possible speedy, foolproof field use of these resins, it was necessary to devise a method of packaging which would permit the resin to be mixed with its activator immediately prior to application, since the curing process begins as soon as the two components have been combined. The solution to this problem was the development of a two-compartment, single-use flexible package made up of a heat-sealable polyester film. These Unipak bags are fabricated with a dividing membrane sealed between the two side-

walls, separating them into two independent sections which contain the two components of the resin system, in exactly the correct amounts.

Both polyvinyl chloride and cellulose acetate butyrate have been used by 3M for the molds in which the epoxy resin is cast. In the latest versions of the splicing kits, two-part molds are used, the halves of which are merely snapped together after the wire splice has been made. Injection molded with a tongue-and-groove which insures a secure fit when snapped together around the wire connection, these molds are virtually foolproof. They are supplied in both a straight-line type and a branched design which accommodates wye connections.

Properties required in the plastic molds include dimensional stability, sufficient resiliency for good impact resistance, enough rigidity to allow the molds to be snapped together easily and hold their shape, and adequate heat

For earlier versions see MODERN PLASTICS 32, 212 (Nov. 1954).

Two-part mold of the branched type for potting a wye splice. After the two parts are snapped together, epoxy casting resin is poured into mold



resistance to prevent distortion of the mold by heat generated during curing of the resin. Both cellulose acetate butyrate and polyvinyl chloride meet the qualifications outlined. The electrical properties of the mold material are not of primary importance, since the insulation of the splice is achieved by the epoxy resin.

Making the splice

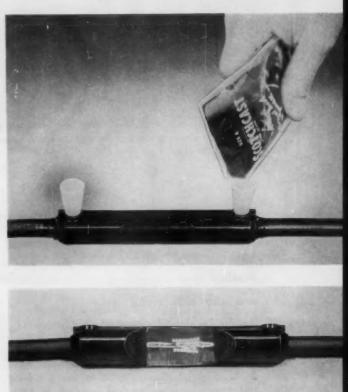
The steps in making typical electrical splices with the 3M Scotchcast kits are as follows: First the wire insulation is removed and the wires are joined by mechanical fasteners, soldering, or other means. Next, the plastic mold is placed around the splice. The molds are made with stepped ends so they can be cut off at the proper point with a pocket knife to accommodate a range of cable sizes. After the mold has been snapped together over the splice, small molded polyethylene pouring spouts are inserted in the outlets.

Next comes the preparation of the epoxy resin, which merely involves pulling outward on the walls of the container to break the barrier between the two parts of the bag; mixing the resin and activator is accomplished by squeezing each end of the bag alternately until the mixture becomes uniform in color—a process requiring only a few seconds. One corner of the bag is then cut off and the prepared resin is "milked" directly into the splice mold through the pouring spout.

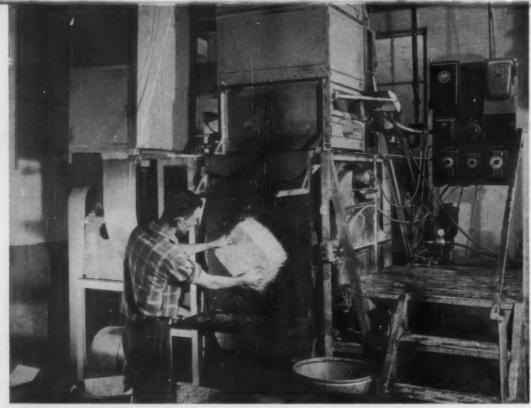
Cure of the resin begins immediately and proceeds without further attention. The cured splice seals the wires into a permanent assembly having excellent strength and electrical insulating characteristics. Once cured, the epoxy resin effectively blocks entry of moisture in weather-exposed locations, direct burial in the ground, or offshore water installations. In addition to a dielectric strength of 800 v./mil, the epoxy resin has excellent mechanical strength along with good water, oil, solvent, and weathering resistance. Cut-away sections of typical splices made by this method show that the fluid resin not only fills all voids within the plastic mold, but also works its way between the individual strands of the wire, forming an effective block to any water traveling along the conductor or along the insulation.

Credits: Molded plastic molds for cable splices produced by Minnesota Mining and Mfg. Co., using butyrate supplied by Eastman Chemical Products, Inc., and polyvinyl chloride supplied by B. F. Goodrich Co. Epoxy resin used in kits supplied by Minnesota Mining and Mfg Co.





Potting a straight in-line splice. First, splice is placed in one half of mold (top photo). Next, the mold is snapped together, polyethylene pouring spouts are inserted in outlets in mold; prepared epoxy resin is milked into one spout (center photo); trapped air vents through the other as resin flows into mold. Bottom photo shows cut-away view of potted splice. Resin has filled all voids. (Photos, Minnesota Mining & Mfg. Co.)



Automatic preforming machine in operation. Glass roving feeds from container at left of operator into plenum chamber at top of machine where it is chopped into short fibers

Preform automation

Production is stepped up, uniformity maintained, and labor reduced by use of newly developed automatic equipment

Reinforced plastics molding takes a long and important step toward automation with the introduction of automatic equipment for the production of preforms. Machines of this type chop fibrous glass roving into short lengths, deposit the reinforcing material on revolving perforated mandrels, spray a liquid binder on the preform, and carry it through an oven section which cures the binder, turning out a finished preform ready to be impregnated with polyester resin and molded.

On many reinforced plastics molding jobs, speed of production is limited not by the molding operation, but by the rate at which preforms can be made and cured. In the conventional method of preparing preforms, an oper-

ator is required to spray the resin binder on the preform as it is being built up in a plenum chamber on the revolving screen mandrel. Preforms are then transferred to a separate oven for the curing operation which sets the binder and enables the preform to be handled. Further handling is required to move the preforms from the oven to the molding press. The objective of automatic preforming equipment is to reduce the labor involved in handling preforms, maintain uniformity from piece to piece, and turn out finished preforms with considerably more rapidity.

One of the first reinforced plastics molding plants to install such fully automatic preforming equipment is Structurlite Plastics Corp.,



Close-up of helmet preform being removed from mandrel. Chain-and-sprocket drive is visible at left



Over-all view of automatic helmet preforming operation. Scale on table is used for periodic check-weighing of preforms



Finished helmet being removed from molding press. (Photos, Structurlite Plastics Corp.)

Hebron, Ohio. A pioneer in the production of reinforced plastics parts ranging from safety helmets and welding shields to air conditioner housings and one-piece interior cabinets for refrigerators, this company was also instrumental in bringing about the development of automatic preforming equipment.

Two machine sizes in use

At present, Structurlite is operating two rotary type automatic preforming machines. The first, a 24-in. unit, was placed in operation by the company about two years ago and is operating on a 24-hr. basis, turning out preforms for safety helmets, welders' face shields, and other products. With the recent installation of a 30-in. rotary machine, the company is now able to use automatic preforming for products as large as contour chairs.

The company's experience to-date indicates that one automatic preforming unit can keep pace with up to three molding presses, depending on the part involved. Prior to installation of the 24-in. preforming unit, Structurlite could turn out approximately 300 safety helmets per day. Output was limited by the capacity of the conventional plenum chamber. With the new machine, production has been

stepped up to approximately 200 finished parts/ hr., with actual reduction of the amount of labor involved. Preforming cost under this system is approximately 56¢ per pound.

Use of automatic preforming not only leads to more efficient utilization of plant labor, but also results in the production of more uniform preforms. Once the machine has been adjusted to handle a given preform, the complete operation is controlled by automatic cycle timing, insuring uniform fiber distribution, equal weight, and correct oven cure from one preform to the next. Interlocked electrical controls regulate the operating time intervals of the roving chopper, binder spray gun, spray gun delay, preform turntables, and other parts of the production cycle. Using this type of preform equipment, the operator has only to remove cured preforms from the machine and attach new skeins of roving as required. The production cycle also allows him sufficient time to checkweigh preforms at intervals to make certain that specifications are being held.

The sequence of operations performed by the automatic preforming machine begins with actual building up of the preform on a conventional type of perforated metal mandrel and spraying of the preform with liquid resin

binder. Next, the preform progresses through a two-stage oven where controlled air circulation and gas-fired heat cure the resin, giving the preforms sufficient rigidity to permit handling. The preform remains under vacuum while transferring. Following the curing operation, it emerges from the machine and is removed from the perforated mandrel by the operator.

Design and operation of the machine are apparent in the accompanying photos. The four turntables to which the preform screens are mounted are located on the faces of a hollow square which is rotated by a chain-andsprocket drive mechanism. At each stage of the cycle, the frame carrying the four preform screens advances a quarter-turn. In the first stage, the mandrel is in the vacuum chamber located at the top of the machine. In this position, it begins to rotate, driven by a rubberwheel friction drive. Simultaneously, the roving begins to feed through the top of the chamber, the cutter goes into operation, and the chopped fibers are sucked down by vacuum onto the perforated screen. At the proper instant, resin binder is automatically sprayed onto the rotating preform from an adjustable nozzle.

These operations then stop while the preform advances a quarter-turn into the first oven section, bringing the next preform screen into position in the plenum chamber. On the fourth stage of the cycle, after the preform has passed through the second zone of controlled heat, it emerges at the side of the machine, where it is stripped off by the operator. By thus producing

preforms on a continuous basis, the rotary unit can turn out as many as 120 units/hr., depending upon their shape, size and thickness. The machine can be stopped at any stage of the cycle by means of a pushbutton control conveniently accessible to the operator.

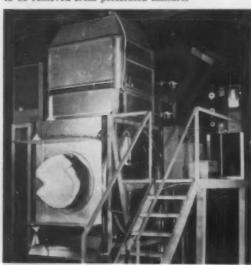
Maximum operating efficiency

Each preform turntable has an opening in the center so that air can be drawn through the screen to produce the required vacuum in making the preform. The machine is equipped with a built-in screen collector for fan discharge. The plenum chamber has movable side plates so that the amount of air drawn into the chamber during preforming can be adjusted for maximum operating efficiency.

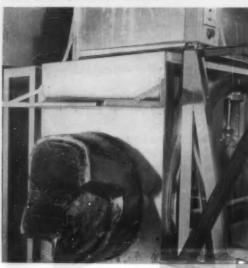
Following removal of the preforms from the preforming unit, the reinforced plastics parts are molded in the conventional manner, using matched metal dies. Preforms are placed in the mold, polyester resin in a measured amount is poured over the preform and the press is closed for the curing cycle.

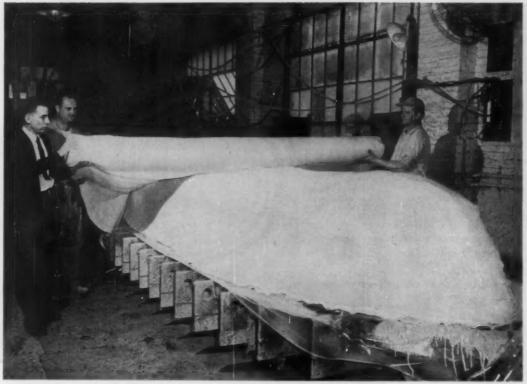
It is believed that the concept of automatic preforming, first placed in actual use by Structurlite, marks a significant new step in the efficient, economical production of reinforced plastic parts. As reinforced plastic applications continue to multiply and competition sharpens in this field, more and more molders will probably turn to some method of automatic preforming to keep their production costs in line. Credit: Automatic rotary type preforming machines by I. G. Brenner Co., Newark, Ohio.

Large rotary-type automatic preforming machine, with contour chair preform ready to be removed from perforated mandrel



Close-up of preform mandrel used in the automatic production of contour chair preforms. (Photos, I. G. Brenner Co.)





Needled bat of acrylic fiber veil being placed atop a fibrous-glass lay-up prior to molding a reinforced plastics boat hull (Photo, Du Pont)

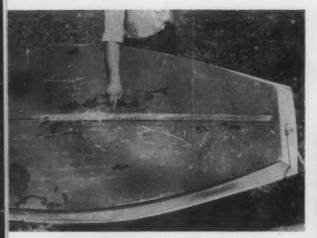
Veils and or overlays

How, why, and when to use them in molding reinforced plastics

ngineered finishes for the industrial market and enamel-like and decorated finishes for the consumer markets have become realities through the use of "veils" or "overlays" to produce a reinforced resin-rich surface on reinforced plastics. Veils are generally made of tiny filaments or fibers of synthetic or natural textile materials in the form of a non-woven fabric. Many different materials being used or tested for use as veils include glass, polyester and acrylic synthetic fibers, cotton, paper, viscose and acetate rayon, and nylon. Choice of the veil material hinges, of course, on the requirements of the specific product that is being made.

Use of veils in producing a smooth surface

for reinforced plastics was prompted by experience with unreinforced gel coat surfaces. This latter surface is simply a layer of dense pigmented resin molded onto the product. Use of a gel coat improves a product's appearance by permitting it to be made in a solid color and, to a certain extent, hiding the appearance of the reinforcing fibers. In addition, a gel coat imparts some weather resistance and corrosion resistance by covering the glass strands more effectively. However, a gel coat cannot be successfully applied to hot matched metal dies for several reasons, including fumes produced in spraying the resin and from the resin volatilizing on the hot die faces. Consequently, gel coating has been limited to use on cold



Right half of reinforced plastics keel above is molded with veil, left half without. After normal use for one season, the veiled part shows no sign of damage while the unveiled portion (finger pointing at it) exhibits evidence of severe damage from abrasion. (Photo, Carbide and Carbon Chemicals Co.)

Molding reinforced plastics instrument panel for a Studebaker car, using an over-lay veil 30 mils thick, so thin that reflection from rear strain rod can be seen through it. Male section of mold directly above operator's hand is for forming the glove compartment. (Photo Molded Fiber Glass Body Co.)



dies, usually with long curing cycles, not suitable for mass-production of low-cost high quality parts.

Advantages of veils

The veil-covered surface offers many important advantages over the gel coat. In practice, a single layer of veil material is put on the outside of the proper weight of chopped strand mat or preform and resin is then applied to the sandwich, which is then molded by standard techniques. The tiny veil fibers completely cover underlying layers of relatively heavy strands of reinforcement and the resultant surface is both hard and smooth.

In the production of reinforced plastics parts not covered by veil, the resins used may shrink as much as 10% volumetrically, resulting in the heavy strands of the reinforcement coming to the surface. As a result, the surface may be uneven and there is a chance that some strands of glass or other base fiber may break through the resin-bonded surface. Use of a veil minimizes the effect of this shrinkage by insuring that the strands of reinforcement are held below the veil surface. For most applications a non-woven veil material weighing from 2 to

8 oz./sq. yd. is recommended. Needled felt mat, bonded fiber material, mechanically interlocked felt, or chemically bonded filaments are commonly used. The principal advantage of using non-woven veils is that the mass of single filaments or fibers provides a smooth surface with good reinforcement properties. A woven or knit veil is commonly recommended only when producing articles in which the veil has to be pulled around a complex mold.

Type of veil material used will vary with the method of production. In matched metal die work, pressures are high, generally well over 50 p.s.i., and a low-density felt-like material with high resin absorption properties is recommended. In low-pressure production processes such as hand lay-up and vacuum bag molding, a high-density cloth or fiber-bonded non-woven felt with low resin absorption properties is recommended.

Veils in commercial use

Glass veils have had the widest commercial use to date. Two types of non-woven glass veils are currently in use. One is designed for flat surfaces, and the other for rounded surfaces and preform work. Relatively stiff glass veil is recommended for flat surfaces. A flexible glass veil is recommended for use in preforms and on rounded surfaces. Glass veils have found widespread usage in the automotive field; reinforced plastics sports car parts which require painting are made with glass veil. Exterior parts of the Corvette, for example, are covered with one layer of 0.300-in. glass fiber veil.

The ability of acrylic fiber veils to provide an extremely smooth finish looks promising for automotive applications, but complete wetting-out so far has been a problem. Reverse impact on acrylic textile veil-covered surfaces is not yet equal to fibrous-glass veil-covered surfaces. A reinforced plastics part using an acrylic veil can be finished, after sanding, by wiping the surface with a liquid consisting of 7 parts ethylene carbonate, and 3 parts propylene carbonate at room temperature. This mixture will dissolve any acrylic fibers which may appear on the surface, leaving a glass-smooth surface finish.

Last year approximately 3000 boats were produced using acrylic, polyester, or glass veils. They give the boat hull greater resistance to impact, abrasion, corrosion, weather, water, micro-organisms and ultra-violet rays.

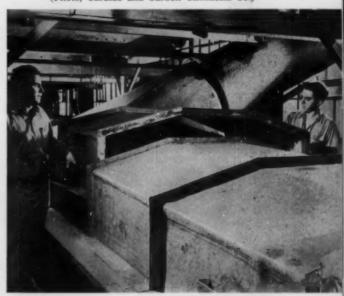
Acrylic, polyester, and nylon are being used in a variety of industrial corrosion-resistance and material-handling applications. Synthetic fiber veil-covered surfaces improve chemical resistance, ultra-violet resistance, and dielectric factors and provide harder surfaces. Acrylics are particularly good for their resistance to weak or non-oxidizing acids, nylon for its alkali resistance, and polyesters for their electrical characteristics. Considerable interest in the practical application of this latter property is being shown by producers of etched copper circuits. These veil materials are also used in reinforced tanks, ducts, machine tool parts, panels, and laboratory sinks and trays.

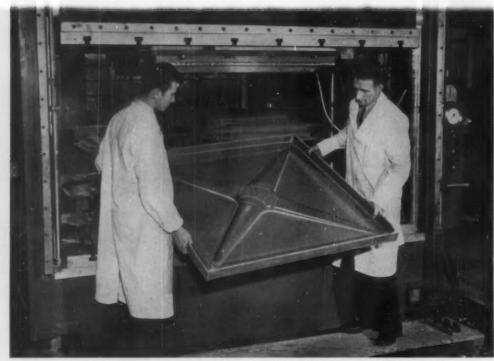
Large quantities of food serving trays are now being made of reinforced plastics with veil-covered surfaces. Previous reinforced plastic trays made without veil were not satisfactory because constant high-temperature washing with strong detergents caused the resin to shrink away from the coarse glass fiber strands, which also swelled up from moisture absorption by capillary action. This action caused rough surfaces which collected dirt, becoming both unsanitary and unsightly. An unreinforced gel coat would not stand the rough usage required of (To page 223)



Glass-reinforced panels made with decorative veil, reportedly the first such application, installed in kitchen cabinets. (Photo, Kemlite Corp.)

Reinforced plastics stack and exhaust hoods produced by Haveg Industries are covered with an acrylic veil. They have withstood corrosive action of hydrofluoric acid and nitric acid fumes for over two years at the Wallingford Steel Co., Wallingford, Conn. (Photo, Carbide and Carbon Chemicals Co.)





Molded panel for stationary tank is removed from press. By using variety of resins, panels can be given special chemical-resistant and fire-resistant properties

Tanks unlimited

Molded modular reinforced plastics panels are gasketed and bolted together to form liquid-holding tanks of any size

By means of molded modular glass reinforced polyester panels, Microcell Ltd., London, England, has eliminated size limitations in stationary tank construction. Additional advantages in economy and function are also apparent.

The panels are simply bolted together with gaskets between the lip edges; and reinforced plastics tie rods provide "bridging" strength.

One third the weight of steel

Each reinforced plastics panel is about onethird the weight of a steel panel, so transportation costs and assembly labor costs are cut. It is possible for one man alone to erect a huge tank structure. The reinforced plastics material can be readily machined to accommodate fittings and with a variety of resins it is possible to make the units fireproof.

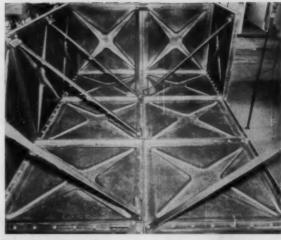
The panels and therefore the tanks made out

of them are resistant to dilute acids and alkalies, to most organic solvents, to salt solutions, to hydrocarbons, and to oils.

The biggest tank constructed so far is of 50,000-gal. capacity but tanks double and triple that capacity can quite easily be made out of combinations of the same modular panels. Since corrosion resistance is combined with prevention of electrolytic action, these tanks are adaptable for use in over 40 industries, including food plants, oil refineries, paper making, distilleries, fertilizer plants, soap manufacturing, dyeing and bleaching, laundries, tanneries, flour and grain storage, etc.

Plus advantages of this panel proposition are that there can be long-term storage of panels prior to tank erection and that for the first time installation underground is entirely practical. Finished tanks resist the effects of extremes of heat, cold, and humidity.



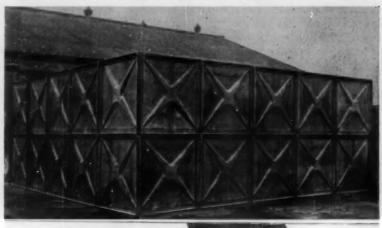


Reinforced plastics tie rods used in assembly of sections give added strength and rigidity to tank

Lightweight panels are easily carried, save labor and transportation costs



Capacity of tank can be doubled by adding one row of panels vertically; for still greater capacity, more panels can be added



Polyethylene on wire

Originally used only as insulation, the mechanical properties of the polymers are broadening the base in wire and cable applications

By W. J. Canavan*



Submarine cable, insulated with polyethylene, is stored in large water tank aboard ship. Lightweight polyethylene assures reliability of signal transmission, facilitates laying and recovery of cable

he rapid over-all growth of the polyethylene industry has been an important factor in the increased use of plastics as electrical insulating materials. In 1944, the first full year of commercial production, a total of 15 million lb. of polyethylene was manufactured in this country. It is estimated that the manufacture of this material totalled 550 million lb. or more in 1956. The increase in the market for polyethylene can be attributed in part to its use in extruded wire and cable insulation, a field which consumed approximately 38 million lb. of poly-

ethylene in 1955. Only the film and molding fields are ahead of wire and cable insulation in total pounds consumed.

History

By the outbreak of World War II, polyethylene was established as a superior dielectric material and large-scale production was begun to satisfy increasing military demand. Polyethylene was first considered for high-frequency radar insulation by the British and later was used also for insulation in submarine cables. Polyethylene-insulated telephone cables were utilized in D-day landings in Normandy.

^{*}Manager, Extrusion Materials Div., Bakelite Co., Div. of Union Carbide and Carbon Corp., New York, N. Y.

During the early postwar years, polyethylene was released to industry. Many new uses were found and production increased rapidly. By the end of 1953, 150 million lb./year were being produced and within two years that figure climbed to 350 million pounds.

Properties

Polyethylene is a tough, permanently flexible thermoplastic material whose electrical properties make it ideal in many ways for wire and cable insulation. It possesses what are often referred to as the most outstanding electrical properties of any flexible dielectric material. It has a high a.-c. and d.-c. resistivity, a high dielectric strength, a low dielectric constant, and a low power factor. Polyethylene's exceptional electrical properties, notably those for high-frequency insulation, have rapidly become indispensable for radio, television, radar, and telephone applications.

The physical and chemical properties of polyethylene are also of prime importance in wire insulation applications. Excellent resistance to chemicals and to cracking and shattering at very low temperatures, light weight, ready extrudability . . . these are properties which make polyethylene well suited for the purpose.

Carbon black-pigmented polyethylene used as a covering for line wire, service drop cable, and other weatherproof applications will withstand the most severe climatic conditions. In addition, 2½% of carbon black in polyethylene will most effectively screen out the destructive ultra-violet light present in normal sunlight without adversely affecting the physical and electrical properties of the material.

Resistance to water and moisture is essential in maintaining the integrity of any insulating material. After two years' immersion in water, the electrical properties of polyethylene eviInsulated with polyethylene, all-aluminum power cable used for temporary installation on large construction jobs carries 440 V., is light in weight and therefore easily handled in field work

dence no marked change. The change in dielectric constant was only 0.8% after three years' immersion in water at room temperature and was only 2.8% after three years in water at 70° C.

Tests have proved that although polyethylene is not completely non-flammable, its burning characteristics as a line wire covering compare very favorably with other materials used for this purpose. Polyethylene for line wire and other weatherproof covering applications has demonstrated excellent resistance to attack by ozone—considerably better resistance than any other extruded covering commonly used. The lack of adhesion of polyethylene in combination with its stiffness makes it easy to strip the insulation from the wire. As a result, installation time has been reduced—an important sales advantage.

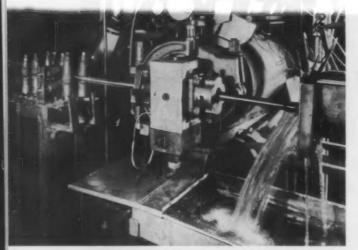
In considering a few of the conditions which affect the properties of polyethylene, it is found that variation in molecular weight has its greatest effect on low-temperature proper-

To	blo	Properti	ac of	malwest	hylanos
			1936 F.) I	THEFT	nvienes

Property .		-pressure olymer	High-pressure polymer
Specific gravity, 23/23°	C.	0.95	0.92
Melt index, g./10 min.		0.4	1.5
Crystallinity, %		75	52
Brittleness index, °C.			
80%		-90	70
50%		-95	80

Table II: Stiffness in torsion

Temperature	Low-pressure	High-pressure
°C.	p.e.i.	p.s.i.
-50	310,000	230,000
0	175,000	48,000
23	100,000	24,000
70	25,000	7,000
90	14,000	too soft
100	9,000	11



Extrusion-coating of multi-conductor cable with polyethylene. Cable enters cross-head die at left, emerges coated at right

ties and resistance to stress cracking. An increase in molecular weight noticeably improves both of these properties, while other properties such as stiffness and tensile strength are slightly improved. In addition, the polyethylene polymer has found its wide areas of usefulness because it is both crystalline and amorphous. While a totally amorphous material would be very soft and waxlike, a totally crystalline polymer would be hard and brittle. Since density is a measure of the crystallinity, the higher the density the more the polymer would tend towards the hard and brittle end of the spectrum, and vice versa. Crystallinity affects physical properties such as tensile strength and stiffness to a large degree. A whole range of polymers having various crystalline-amorphous ratios, as indicated by their density, will soon be available.

Markets

Since 1945, there has been a steady increase in the use of polyethylene as a wire insulating and jacketing material, especially for communication cable. The excellent low-loss properties of polyethylene make it particularly suited to coating television lead-in wires, coaxial cable designed for radar, and other high-frequency communication applications. The excellent abrasion and weather resistance of carbon black-pigmented polyethylene make it ideal for the outer jackets of telephone cables. Alpeth and Stalpeth cables with their light weight and extremely good resistance to corrosion are widely employed in the telephone field and are the leading users of such polyethylene coatings.

Cellular polyethylene entered the communi-

mary insulation in telephone cables. In manufacturing cellular polyethylene, a chemical blowing agent which liberates inert gas at a specified temperature is dispersed throughout the plastic material. This gas is liberated during the extrusion operation, producing a foam structure. Cellular polyethylene has a dielectric constant of about 1.45 and a specific gravity about one-half that of regular polyethylene.

Signal Corps field communications wire and

cations field as a replacement for paper as pri-

Signal Corps field communications wire and cable serve as the backbone of military communications in tactical operations. Infantry field wire, constructed of a thin, extruded wall of nylon over a polyethylene insulation, was thoroughly combat-tested in Korea. It was praised by those who relied on the wire for

Table III: Yield strength' of polyethylenes

Temperature	Low-pressure polymer	High-pressure polymer
· C.	p.s.i.	p.s.i.
* 23	3000	1400
60	2000	850
100	700	170
120	400	

*At a rate of strain of 1.00 in./min.

Table IV: Electrical properties of polyethylenes

Property	Low-pressure polymer	High-pressure polymer
Power factor, 50 mc. Dielectric constant,	0.0002	0.0002
50 mc. Dielectric strength av. v/mil for 0.125	2.34 in.	2.27
step by step	530	500
short time	580	590

Table V: Mechanical properties of polyethylenes

Properties Le	polymer	High-pressure polymer	
Tensile strength, p.s.i. Ultimate elongation, (including	3600	1700	
cold drawing)	150	600	
Yield strength, p.s.i. Durometer "D" hardne	3000 ess	1400	
at 23° C.	58	42	

their communications and safety because of its dependable service, light weight, resistance to rough treatment, and easy handling in storage, payout, and recovery.

Polyethylene insulation has in part made possible the first long-range submarine telephone cables. Polyethylene is the inner insulation for both the new telephone cable from the State of Washington to Alaska and the new North Atlantic telephone cable, the latter a joint effort of American Telephone and Telegraph Co., British Post Office, and Canadian Overseas Telecommunication Corp. The 1600mile Alaskan cable is the longest completely American telephone cable ever constructed. The use of polyethylene results in 100% reliability against fadeout or atmospheric disturbances, thus providing local-call clarity. Other advantages of polyethylene for submarine cables include its low rate of water absorption, chemical stability in corrosive sea water, and inherent flexibility. Polyethylene's light weight contributes to the relative ease with which the cable can be laid or recovered.

The second largest amount of polyethylene in the wire field is used as a covering for utility power line wire and service drop cable. Principal advantages in these applications are the retention of properties at extremely low temperatures, practical handling qualities, low weight, moisture resistance, and long-time weathering. The comparatively smaller diameter of polyethylene insulation diminishes the effective wind load on line wire, thus increasing the actual fatigue life of the wire. Polyethylene-covered wire and cable have received increasing acceptance in the utility industries, replacing other types of insulated wire for underground service. Besides being used extensively in central station control service-cables, polyethylene has entered the overhead lighting system on flying taps between the overhead conductors and the lighting heads on the mast arms.

On power lines, polyethylene has been used successfully on a large scale to protect lead sheaths against corrosion and damage in handling, a duty for which it is well qualified because of its water-resisting and self-lubricating properties. Because of the support and protection afforded by polyethylene, dual-sheathed cable can withstand repeated reeling and installation, thereby increasing the service life of the wire.

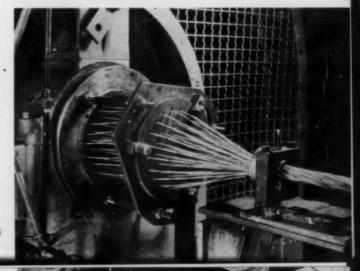
The design and selection of electrical cable for modern chemical plants pose many serious engineering problems. Acids, alkalies, solvents, chlorine fumes, and other chemicals can corrode, dissolve, or embrittle many cable insulations. Stoppages of pumps, agitators, etc., through line failures may permit chemical reactions to get out of control. The chemical inertness of polyethylene makes it of particular value for use in feeder systems where chemicals and fumes above ground, and chemical seepage below ground, threaten power cables.

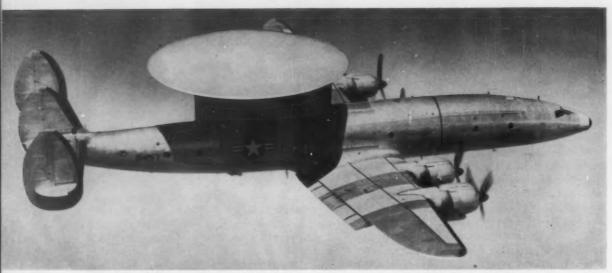
Wire coating

Wire coating by extrusion is quite similar to general-purpose extrusion except that a "T" or cross-head is used instead of a "straightthrough" head. Wire is paid off from a tensionmaintaining device into a preheater where it is heated by gas burners or by resistance heating. The preheating of wire helps to remove any residual oil or drawing-die lubricant which may be present. From the preheater the base wire passes into the die and through guides mounted in a cross-head or "T". Pressure exerted by the screw forces the polyethylene resin around the guider and out of the die. At the same time, wire passes through the guider and emerges coated with a sheath of polyethylene. The coated wire is then cooled in a water trough and wound on reels. The applied wall thickness may be as thin as 0.010 in. or greater than 0.500 inch. The rate of extrusion is dependent upon several factors, mainly the speed of the take-off equipment, the cooling facilities, the thickness of the applied insulation, the type and speed of the screw, and the die design.

Early establishment of polyethylene on the commercial market (To page 227)

Several polyethylene-jacketed single conductors being wound into multi-cable conductor. (Photos, Bakelite Co.)





Lockheed WV-2 Series Constellation, with largest airborne reinforced plastics radome produced to-date, in flight. Craft is military radar picket ship. (Photos, Zenith Plastics)

Four hectic months!

Largest reinforced plastics airborne part was conceived, designed, tooled, molded, finished, and installed in 120 days

By Samuel S. Oleesky*

hat is believed to be the largest single airborne part made from reinforced plastics was recently flown on a Lockheed WV-2 Series Constellation. The airplane, a military radar picket ship, is the same type that has previously been flying with large radomes mounted ventrally and dorsally. New tactical and strategic requirements, however, indicated a need for other types of electronic equipment. A "crash" program was therefore initiated by Lockheed staff engineers to design, develop, fabricate, and install the larger radome for prototype evaluation.

Through close liaison and continuous collaboration with their radome contractor, Zenith Plastics Co., it became possible for the Lockheed personnel to realize a seemingly impossible desire; namely, to install the radome less

than 120 days from the time of its original conception. Only four months were required for design of part, design and fabrication of tools, building, trimming, and assembling the radome, although problems had to be solved that had never before arisen on smaller jobs.

While the details of the radome design are not available for publication for security reasons, it may be stated that the part, completed, weighs over three tons. It required the use of over 3000 sq. yd. of glass cloth, about 500 cu. ft. of glass cloth honeycomb, and more than a ton of polyester resin, plus over 80 gal. of mold release agent and numerous lesser items.

The radome resembles a large discus, being over 30 ft. in diameter and several feet thick at the center of rotation. This huge part rotates in flight, mounted atop a pylon about 8 ft. high above the dorsal skin of the airplane. To support this weight, an 18-in. steel column was

^{*}Chief scientist, Zenith Plastics Co., subsidiary of Minnesota Mining & Mfg. Co.

mounted in a specially reinforced section of the airplane.

The story of how the radome was made starts, of course, with the conception of requirements by the military, who turned to Lockheed engineers for implementation. Basic studies were made by the aerodynamicists to assure acceptable performance of the airplane under the unusual flight loading conditions. When these studies were completed to the satisfaction of all concerned, Zenith Plastics engineers were called in to examine the Lockheed designs and to develop methods of construction which would guarantee not only structural integrity of the radome and airplane, but also would meet the rigid requirements imposed by the electrical performance of the enclosed equipment.

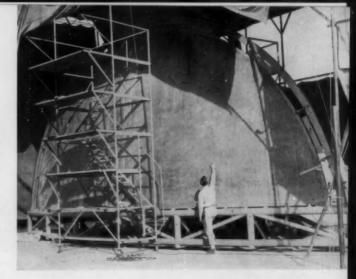
Examples of the stiff requirements may be cited. In the radial dimension of the circle, a maximum deviation of 0.250 in. (on a 15+ ft. radius) was permissible, while in skin thickness of the electrical sandwich, tolerances of 0.010 in. were critical.

Made in eight pieces

Immediately upon receipt of the Lockheed specifications and drawings, Zenith engineers began development of detail prints for the shop. Simultaneously, the Tooling Department initiated design and construction of the large molds required for assembly of the part. For simplicity, it was decided that the radome should be made in eight pie-shaped pieces.

With delivery dates always staring them in the eye, the tool designers selected cast phenolics as the logical type of mold material. Phenolics are relatively stable dimensionally, they provide excellent surface properties, and—of prime importance—they lend themselves to rapid fabrication, as compared to metal tooling. From the standpoint of economics, too, the expenditures required for metal tooling were not justifiable on a prototype part.

To avoid unnecessary costs and to save time, it was decided that the mold could also be used as a trim fixture. A newly designed fly-cutter was incorporated on the horizontal axis, and a pneumatic router was designed into the mold edge. Because of the peculiar electronic requirements, and the stresses involved, it was obvious that a new method of joining the parts had to be conceived. Provisions for these joints, too, were designed into the mold. Thus, by a combination of judicious pre-planning and careful design, it was possible to make one 90-degree sector mold that would permit fabrication

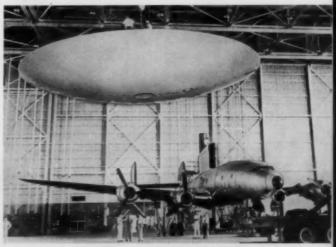


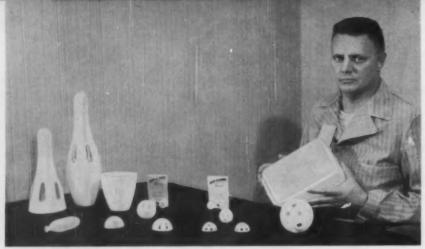
Rough assembly of radome half, showing steel jig and drill hole pads used in putting the various radome sections together

of all eight sections of the radome, while providing sufficient flexibility to allow trimming the individual sections to fit.

This immense sandwich of glass cloth skins and honeycomb core was made with void-free skins. It is believed that these are the largest areas ever so made, and the accomplishment of that job dictated the requirement that work on the radome be continued around the clock, to avoid the problems of resin set-up which would make the void-free technique impossible. Special banks of sun-lamps were built for proper polymerization of the resins, and ingenious methods of fabricating vinyl (To page 226)

Fully assembled reinforced plastics radome suspended over Constellation, preparatory to final installation atop plane





Products made by Cosomatic process; bowling pin stands between two unsealed halves; in foreground are various types of balls and their halves. (Photo, Cosom)

Heat seals for hollow molded parts

Even intricate polyethylene products can be assembled rapidly with newly developed process and equipment

ollow molded polyethylene products ranging from practice golf balls and play balls to featherweight bowling pins and corrosion-resistant battery acid containers are now being successfully produced through the use of specially developed machinery which heat-seals the halves of the objects together. No adhesive is involved in the process; controlled heat and pressure fuse the molded components into a finished product of great durability.

Developed by Clinton V. Carlson, president of Cosom Industries, Inc., Minneapolis, Minn., the sealing equipment thus far built was designed primarily for handling polyethylene products. It is believed, however, that it can also be used to seal other types of thermoplastics.

The only limitation on the use of this sealing process is that the parts to be joined must have parallel faces so that continuous contact can be

Portable bowling game uses hollow and slotted polyethylene pins made by heat-sealing injection molded halves together. Pins are 15 in. high, weigh 5 oz. each. (Photos, Bakelite Co.)





maintained at all points as the parts are fused together. So long as the two meeting faces can be placed in close contact, even intricate parts can be sealed readily. The resulting parts are uniform in wall thickness at the joint, extremely durable, and offer interesting production economies.

Practice golf ball first

First molded polyethylene item to be made by this process was the Pee Gee Bee practice golf ball, now familiar to many golfers. In the manufacture of this ball, the mating halves are first produced by conventional injection molding methods. Molded with perforations for lightness and reduced "carry," the halves are then heat-sealed together on rotary type semi-automatic equipment to form the finished ball. The effectiveness of the seal is indicated by the fact that many thousands of the plastic balls have been sold and are standing up under the battering of woods and irons as serenely as a duck takes raindrops.

Similar to the Pee Gee Bee, but larger in size, is the Wiffle Ball, a lightweight, virtually indestructible play ball that is being batted and thrown around playgrounds, streets, and backyards all over America. Molded with perforated walls, the two hemispheres forming the finished ball are also heat-sealed together on Cosomatic equipment. A principal advantage of the Wiffle Ball, aside from its excellent play value, is the fact that it cannot damage windows and is so light that it cannot injure even small children who may be struck by it.

Industrial uses

One of the most recent uses for this heat-sealing process is in the production of hollow polyethylene balls which float in blankets on the surface of tanks containing heated solutions of powerful plating acids. These Go-Mist balls prevent fumes and spray from rising into the air above the tanks. Heavy racks of piston rings, auto bumpers, appliance components, and other metal parts are being constantly submerged into and withdrawn from plating tanks through protective blankets of these heat-sealed plastic balls, which endure month after month of physical battering and contact with hot corrosive acid solutions.

Another product made by the same combination of injection molding and heat sealing is a lightweight bowling pin which is used in the Bowlite bowling game set made and sold by Cosom Industries. The hol- (To page 225)

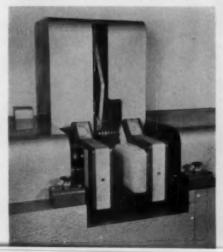


Rotary-type machine for heat-sealing practice golf balls. Operator at left places matching halves into machine for sealing



Chrome-plating tank blanketed with hollow polyethylene balls that prevent spray and rising fumes; balls are unaffected by acid

Close-up of unit for sealing battery acid container, showing chuck and heater. (Photos, Cosom)



Plastic ladders

Sandwich construction of fibrous glass and polyester resin is being used in the production of a non-corrosive and non-conductive ladder which is ideal for power and electrical work under all weather conditions. Under test conditions of 50% relative humidity, the ladder did not break down when a potential of 120,000 v. was applied between the rungs.

The fibrous glass-reinforced side rails are combined with aluminum or magnesium rungs, cemented in place to become integral parts of the ladders. Available with either straight or tapered sides, the ladders are light in weight—2 lb./ft.—and are available in lengths from 8 to 40 ft. in single and extension types.

Credits: Ladders manufactured by the Putnam Rolling Ladder Co., New York, N. Y. Laminac polyester resin supplied by American Cyanamid Co., New York, N. Y.



PLASTICS



Measuring cup

The time saving "Wet'n'Dry" measuring cup which is molded in one piece from translucent polyethylene is literally two cups joined end to end. Each end has molded-in graduated markings. When changing from liquid to dry measure, there is no need to wipe the cup dry; just turn over and use the other side. Since the material is odorless, the cup is suitable for preparing infant formulas, and the pouring lips are useful in filling steam irons, etc.

Approximately 4 in. in diameter and 4½ in. in height, each end holds one measure cup. The color is frost white, and since the polyethylene is virtually unbreakable, the double-duty cup requires no special care in handling. It will not rust, and can easily be washed clean in soap and water.

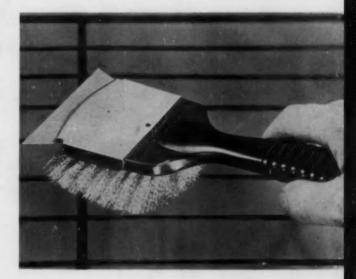
Credits: Manufactured by Westland Plastics, Inc., Los Angeles, Calif. Tenite polyethylene supplied by Eastman Chemical Products, Inc., New York, N. Y.

Barbecue grill cleaning brush

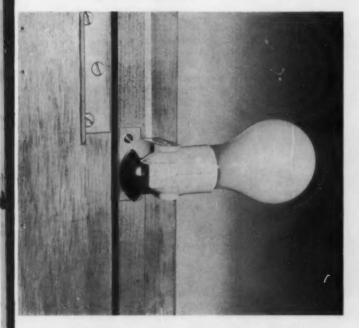
A sturdy brush designed specifically for the job of cleaning barbecue grills has a black back and handle molded of high-impact styrene. The bristles consist of crimped brass wire, flared so the ends can reach into corners and around grill rods to do a thorough cleaning job; a steel scraper set solidly into the back of the brush easily removes the most stubborn spots of charred food.

Molded in one piece, the brush back and handle have adequate strength to withstand rough use. Ridges in the handle provide a sure grip, and a rawhide thong for hanging gives a decorative touch. The handle can be kept clean by dipping in warm soapy water or wiping with a damp cloth. The entire grill brush measures 8¾ inches.

Credits: Manufactured by Empire Brushes, Inc., Port Chester, N. Y. High-impact styrene supplied by Bakelite Co., New York, N. Y.



PRODUCTS



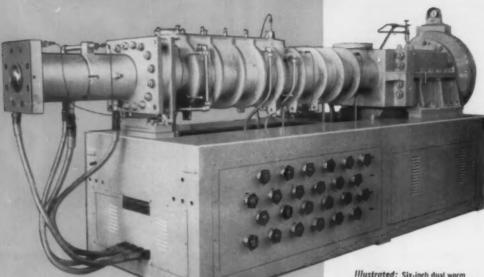
Closet light

Both urea and phenolic are used in the molded parts of a new closet light, which is operated automatically by hinged or sliding doors depressing its cam-shaped push-button switch. The lampholder housing is molded of urea in two parts, and incorporates molded-in screw threads for the lamp base. Connection to the lamp base is made by a single contact strip set into the plastic threads. The actuating button is molded of phenolic.

The materials used provide excellent electrical insulation for the light, which is useful for clothes closets, storage cabinets, etc. It is prewired with a 9-ft. cord.

Credits: Manufactured by General Electric Co., Providence, R.I. Urea supplied by American Cyanamid Co., New York, N. Y., and Plaskon, Barrett Div., Allied Chemical & Dye Corp., New York, N. Y. Phenolic supplied by General Electric Co., Schenectady, N. Y., and Durez Plastics Div., Hooker Electrochemical Co., North Tonawanda, N. Y.

Welding Engineers Compounder-Extruders Can DOUBLE and TRIPLE Your Output With LESS Space and LESS Labor



 When it looks like plant expansion is the only way to meet your sales goals—it's high time to go into conference with Welding Engineers.

Better, faster, more capable equipment is the money-saving alternate to expensive building! You can see the proof from one end of America to the other...where Welding Engineers compounder-extractor-extruders are maintaining their record-breaking output with LESS space and LESS labor for leading plastics and rubber manufacturers.

- There is no obligation when our research and development staff tackles your particular processing or manufacturing problem. And there is no guesswork! We custom fit equipment from limitless variations of dual worm flight characteristics . . . barrel lengths . . . heating and cooling sections.
- Proven performance is engineered into your new W.E.I. machinery, production rates are assured and you can plan with safety. The savings in space...and in labor...are your extra bonus to add further to your profits and your competitive advantages.

Illustrated: Six-inch dual worm extrusion dryer for processing of rubber.

Recent developments:

Devolatilizing of large percentages of solvents and/or monomer from thermoptastics; large volume processing of low pressure polyethylene; high through-put rates for compounding of elastomeric vinyl from powder blends. The W.E.I. line of custom-fitted equipment is complete... from laboratory models to large scale plant machines.

For the Most Successful Plastics Processing in Any Combination of Compounding-Extracting-Extruding ... Experience Proves it Pays to Buy the Best

> WELDING ENGINEERS, INC. NORRISTOWN, PENNSYLVANIA

FOR MORE THAN A DECADE: SPECIALISTS IN THE DEVELOPMENT AND MANUFACTURE OF CONTINUOUS OPERATION EQUIPMENT FOR THE PLASTICS, RUBBER, CHEMICAL AND PETROLEUM INDUSTRIES. WRITE FOR CATALOG NO. 663.



Plastics Engineering

Dr. James F. Carley, Engineering Editor

Shrinkage of thermosets

By A. J. Guzzetti†

olded plastic parts, with few exceptions, are smaller than the molds from which they are produced. This difference in dimensions-or molding shrinkage -though it may be only a few tenths of one percent, is of considerable importance when dimensional tolerances are exacting. Components of assemblies, large pieces which are to be spray painted through a mask, and long molded furniture drawers are examples of moldings requiring very close control of certain dimensions-sometimes as close as 0.001 in./in. of length.

It is generally recognized that the factors affecting molding shrinkage are so complex that exact predictions are impossible. For this reason, the mold designer may face a serious problem in predicting allowances for shrinkage in a mold that may cost thousands of dollars. Sometimes, provision can be made for altering critical mold dimensions at reasonable cost, but, usually, mold changes are costly. Often, to avoid changing the mold, the molder will try variations in molding conditions or materials to match the predictions of the mold designer.

Much is known, in a qualitative way, of the effects of various material and molding factors on molding shrinkage. However, the causes of these effects are not generally understood, and there is relatively little published data on the size of these effects. The work reported here is intended to aid the mold designer and the molder. While most of the data were developed with generalpurpose phenolic molding materials, sufficient information on other thermosets indicate that the principles apply to them, too.

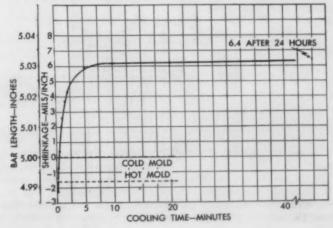
Shrinkage mechanisms

Molding shrinkage is defined as the difference per unit length, in any linear dimension, of a mold and a molded piece when both are at room temperature. Thus, shrinkage is equal to the dimension of the mold minus the dimension of the piece divided by the dimension of the mold. A differentiation should be made here between molding shrinkage and so-called "after shrinkage." The latter usually results from exposure of the molded piece to certain environmental conditions.

The mechanisms by which molding shrinkage occurs are:

- 1) Thermal contraction, which is a function of the ejection temperature of the molded piece and coefficient of thermal expansion.
- 2) Elastic recovery (expansion that tends to reduce shrinkage): this depends directly on the compressibility of the material and the actual pressure exerted on it.
 - 3) Plastic deformation, which

Fig. 1: Shrinkage vs. cooling time. Molding conditions: general-purpose phenolic; mold temp. 325° F.; cure time 180 sec.; pressure 4000 p.s.i.; piece 1/4- by 1/2- by 5-in. bar



^{*}Reg. U.S. Pat. Off.

Presented before Society of Plastics
Engineers, Inc., New York Section, Sept.

velopment Dept., Bakelite Co., Div. Union Carbide and Carbon Corp. of Union Carbide Bound Brook, N. J.

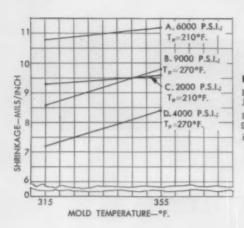
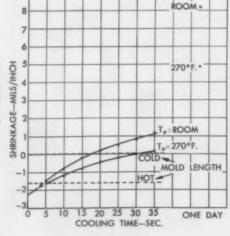


Fig. 2: Effect of mold temperature on shrinkage. Molding conditions: general purpose phenolic; cure time 90 sec.; piece 5-in. bar, 1/4 in. thick.

Table 1: Molding variables

			Mechanism				
	Effect on			ermal action	Elastic recovery	Plastic deformation	
Principal variable	increasing variable	Secondary effect	Piece temp.	Coeff. th. ex.	Pressure on piece	Mechanical distortion	
Mold temp. (T _m)	Increase		X				
Preheat temp.	Decrease	%H ₂ O, cure		X			
Cure	Decrease	Deg. of cure		X			
Pressure	Decrease				X		
Ejection time	Increase					X	
Cooling rate	Increase			(Mechai	nism not kr	nown)	

Fig. 3: Effect of preheat on shrinkage. Molding conditions: general-purpose phenolic; mold temperature 325° F.; cure time 120 sec.; pressure 2000 p.s.i.; piece ¼- by ½- by 5-in. bar



is caused by mechanical distor-

Of the two factors contributing to thermal contraction, that caused by the cooling of a piece from its molding temperature is obvious. The coefficient of thermal expansion, however, represents one of the basic causes of molding shrinkage. This is evident when one realizes that the thermal expansion coefficients of molding materials are greater than those of mold metals.

Elastic recovery, which actually is an expansion, or negative shrinkage, is caused by release of molding pressures upon opening of the mold and subsequent ejection. It is probable that for a short time after ejection from the mold most moldings are larger than the mold itself. Thus, Fig. 1, p. 111, shows a typical cooling curve obtained by measuring the length of a compression molded bar immediately upon removal from the mold and during subsequent cooling. Note that the initial measurement of the piece is larger than the hot mold by almost 1 mil/in.

The final mechanism contributing to molding shrinkage is that of plastic deformation. This phenomenon may be caused by continued pressure—exerted by the cavity—on the sides of the piece after molding pressure has been released and before the piece has been ejected.

The variables affecting these shrinkage mechanisms can be divided into three categories: 1) molding, 2) mold and piece design, and 3) material. The following discussion explains in detail the principal variables in each of these categories and the manner in which they affect shrinkage.

Molding factors

Since the thermal contraction properties of thermosetting materials are altered by chemical changes occurring during cure and by flow, their very nature is changed by the molding process. Table I, left, lists main *molding* variables, secondary effects, and their respective shrinkage mechanisms. If one were to increase each variable while holding the others constant, the following variations would occur:

- 1) Mold temperature (T_m)—shrinkage increases due to higher temperature of the molded piece.
- Preform temperature (T_p)—shrinkage decreases because of lower moisture content and advanced cure, both of which decrease the thermal expansion coefficient.
- Cure time—shrinkage decreases because of a higher degree of cure in the mold, which

decreases the coefficient of thermal expansion.

- Applied pressure—shrinkage decreases because greater effective pressure produces more elastic recovery.
- Ejection time—shrinkage increases with slower ejection in those cases where plastic deformation occurs.
- Cooling rate although shrinkage increases, the mechanism is not known.

These basic phenomena are now examined in greater detail.

Mold temperature: The basic effect of increasing mold temperature is to increase shrinkage. For example, when the same batch of general-purpose material was molded at 315 and 355° F. in two different types of molds, shrinkages were as shown in Fig. 2, p. 112. Conditions for curves A and B, representing plunger molding. differed only in applied pressure and preform temperature. Curves C and D are indicative of shrinkage as studied in compression molding. These curves represent the effect of mold temperature on shrinkage over a range of molding conditions and mold types. Thus, while the effect on shrinkage of increasing mold temperature is well defined, it is also seen that the magnitude of this effect depends on other variables.

Preform temperature: All types of preheating tend to reduce shrinkage for both compression and plunger molding. Increased preform temperature tends to dry the material and advance the cure, and both factors contribute to the decrease in shrinkage by decreasing thermal coefficient of expansion.

This is evident in Fig. 3, p. 112 which shows cooling curves of molded bars produced with no preheat and with 270° F. high-frequency preheat under otherwise equal molding conditions.

Figure 4, above, shows effect of preheat temperature under various conditions. The solid curves represent the effect of preform temperature for compression-molded bars at varying cure times and pressures; the broken curves show the effect of altering the same factors in a plunger mold.

Cure time: Longer cure time (To page 116)

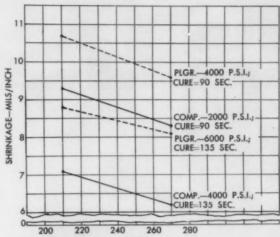


Fig. 4: Effect of preheat on shrinkage. Molding conditions: general-purpose phenolic; mold temp. 315° F.; piece 5-in. bar, 1/4 in. thick.

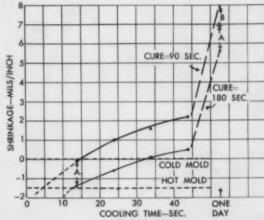


Fig. 5: Effect of cure time on shrinkage. Molding conditions: G-P phenolic; mold temp. 325° F.; preheat temp. 210° F.; pressure 6000 p.s.i.; piece ½- by ½- by 5-in. bar

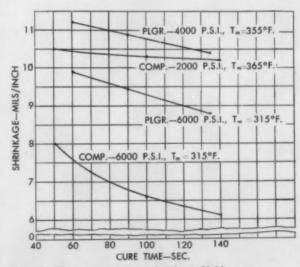
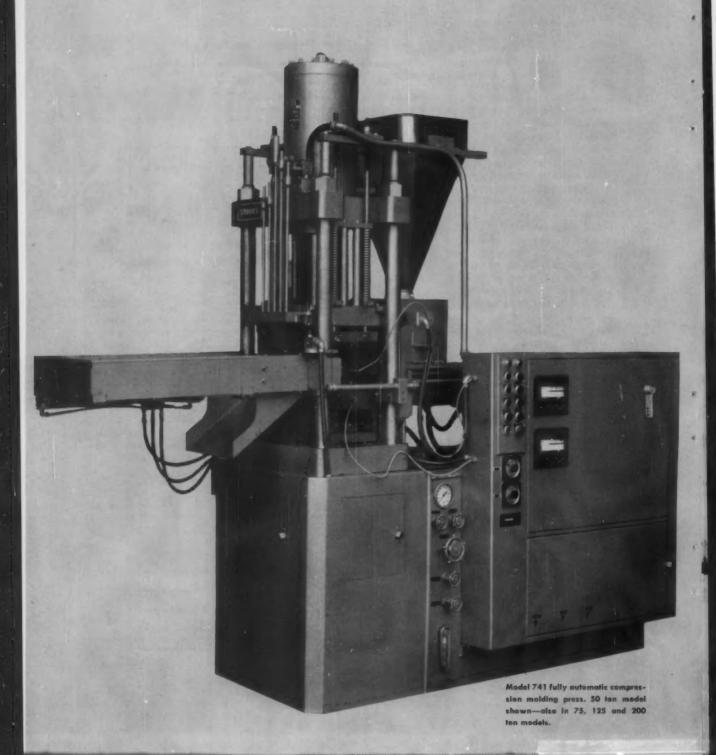


Fig. 6: Effect of cure time on shrinkage. Molding conditions: general-purpose phenolic; preheat temp. 210° F.; piece 5-in. bar, ¼ in. thick

Here is fully automatic

in its



compression molding

most productive, most foolproof form

—the new Stokes Model 741 Presses incorporate exclusive design features to assure most economical output, highest dependability ... available in capacities of 50, 75, 125 and 200 tons.

Check through the features that are built into the new Stokes Model 741 presses—and you'll see why they offer the most advanced concepts of fully automatic molding. They embody original design principles and operational refinements that are the result of Stokes pioneering experience in automatic molding:

Positive ejection system protects molds. Metalto-metal contact between feed and comb, and scrape-off discharge independent of gravity are exclusive Stokes designs which prevent parts from falling back into the mold.

Pre-set loading board simplifies set-up. The feed board is initially set up as part of the tooling for each job. No need to make complex feed settings for each mold change. Complete changeover requires only about five minutes.

Fast press cycle gives high output. Feed board and comb move together . . . giving average dry cycle time of only 8 seconds.

The Model 741 feeds fast . . . presses fast (adjustable up to 27"/min.) . . . ejects fast; ideal for new fast-curing resins.

In-line design saves floor space... permits presses to be set up in batteries with all feed hoppers and discharge bins in two convenient rows.

Automatic sequence interlocks shut down the press if an interruption or double shot should occur.

The 741 has ample versatility to handle practically any molding job. The press provides either top or bottom ejection to suit the parts you're making. Automatic breathe is provided as standard equipment. Presses can be readily converted for direct feed from a pre-heating unit. The Stokes rope feeder is available for automatic feed of pre-mix rope from the spool. Flanged parts can be automatically molded by using side-draw split cavity molds.

Find out today how the new Stokes Model 741 presses can bring new economy and productivity to your molding operations, by writing for our new bulletin and for a consultation on your specific application.

Plastics Molding Equipment Division F. J. STOKES CORPORATION 5529 Tabor Road, Philadelphia 20, Pa. STOKES

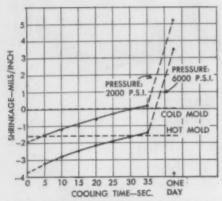


Fig. 7: Effect of pressure on shrinkage. Molding conditions: general-purpose phenolic; cure time 120 sec.; mold temp. 325° F.; preheat temp. 270° F.; piece ¼- by ½- by 5-in. bar

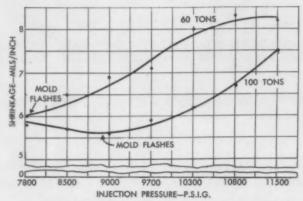


Fig. 8: Effect of injection pressure on flashing. Molding conditions: general-purpose phenolic; mold temperature 315° F.; plasticity grade 9; gate ½ by ¼ in.; piece ¼- by ½- by 5-in. bar

reduces molding shrinkage for two reasons: 1) it reduces the coefficient of thermal expansion of the material and results in less contraction on cooling, and 2) it results in a larger piece initially after its release from the mold, longer cure giving the bar greater elastic recovery after release of molding pressure.

Cooling curves in Fig. 5, p. 113, show the change in dimension of test pieces immediately after they were removed from the mold and as they cooled. Longer cure time increased the elastic recovery of the bar as indicated by the initial points of the curves relative to the hot and cold mold length lines. It is seen that the piece cured at 90 sec. was smaller than that cured at 180 sec. when first ejected from the mold. This difference, shrinkage A, is due to lesser elastic recovery. It is also seen that the piece cured at 90 sec. shrank more in cooling than that cured for the longer time. This difference is increased by the amount of shrinkage B, due to an increase in thermal coefficient.

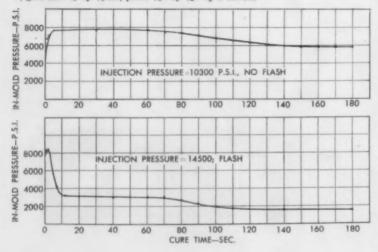
Changing other molding factors

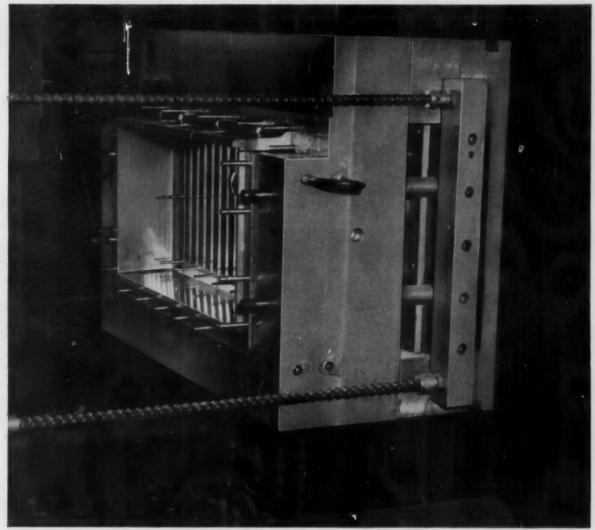
in combination with variations in cure time tends to alter the magnitude of shrinkage differences, but the effect of increasing cure time is always to decrease shrinkage. This is seen in Fig. 6, p. 113 where mold temperature and pressure have been changed over a range of cure times. The slopes of the compression mold curves and the plunger mold curves decrease for increasing cure time and mold temperature. The tendency of the curves to level off indicates that variations in shrinkage diminish due to increased degree of cure-whether because of higher mold temperature or longer cure time.

Applied pressure: Higher molding pressures reduce molding shrinkage because an initially larger piece is produced on release from the mold due to a greater elastic expansion. While pieces molded at both high and low pressures shrink about the same amount during cooling, those molded at the higher pressure are initially larger when released from the mold. This may be seen in Fig. 7, above.

In the plunger molding of phenolics, increasing the injection pressure decreases the shrinkage but only until a pressure is reached at which the mold flashes. Pressure increases beyond this point tend to increase shrinkage. This anomalous increase has been traced to a reduction in the effec-

Fig. 9: Effect of flash and no-flash conditions on plunger molding. Molding conditions: general purpose phenolic; mold temperature 315° F.; preheat temperature 210° F.; plasticity grade 9; gate size $\frac{1}{2}$ by $\frac{1}{2}$ by $\frac{1}{2}$ by $\frac{1}{2}$ by 5-in. bar





CRUCIBLE CSM 2 mold in press at Pro-phy-lac-tic Brush Co., Florence, Mass. The mold, built by Eagle Tool & Machine Co., Hillside, New Jersey, produces vegetable pans for Hotpoint refrigerators.



why CRUCIBLE CSM 2

is chosen for so many big molds . . .

One reason is that CRUCIBLE CSM 2 is always uniform in structure and composition. It's got to be. For the quality of every *heat* is controlled by Quantometer analysis... and every *piece*, regardless of size, is ultrasonically inspected. This means superior machining and polishing characteristics.

Another reason is that CRUCIBLE CSM 2 is immediately available from warehouse stock in 205 sizes, big and small. The job isn't held up for steel when you order CSM 2, the mold steel you can trust and get when you want it. Crucible Steel Company of America, The Oliver Building, Mellon Square, Pittsburgh 22, Pa.

CRUCIBLE

first name in special purpose steels

Crucible Steel Company of America

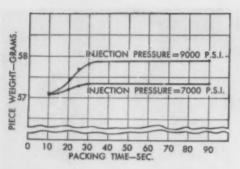


Fig. 10: Effect of packing in plunger molding.

Molding conditions: general-purpose phenolic; mold temperature 325° F; preheat temp. 240° F; plasticity grade 15; gate size ½ by ¾ inch

tive pressure actually exerted on the material due to mold flashing at the higher injection pressures.

In lower curve, Fig. 8, p. 116, which was obtained with 100-tons clamp, increased injection pressure resulted in decreased shrinkage when the mold did not flash. On the other hand, as pressure was raised beyond the point where flashing occurred, shrinkage increased. The upper curve shows effect of causing mold to flash at lower injection pressure by reducing clamp tonnage.

In order to study this phenomenon further, pressure inside the mold was measured by means of strain gages on a special knockout pin. Figure 9, p. 116, is a graphic representation of the mold pressure versus time over a 3-min. cure cycle at conditions of flash (bottom) and no flash (top). When the mold flashes, the pressure momentarily reaches a peak where the mold parts, and then the pressure drops to some lower value.

Under "no flash" conditions,

the data indicate that although pressure in the mold does not reach the injection pressure, the maximum mold pressure is held on the material until the latter part of the cure cycle. The gradual reduction in pressure observed during the latter part of the curing cycle has been observed previously1 and is probably due to volume contraction during cure. The reason that the pressure does not start decreasing immediately in the upper curve is apparently due to packing of more material into the mold while the material in the cavity is still capable of flow, much as a cavity is packed in injection molding. This is shown in Fig. 10, above, a plot of piece weight versus packing time obtained in another mold in which it was possible to close the gate mechanically at various times after the mold was already

Note that the weight of the piece, and therefore amount of

filled.

¹J. M. Rausch and W. Orvis, SPE J. 12, 54 (Jan. 1956).

material in the mold, increased for a considerable length of time after the mold was filled. The final difference in weight for the 2000p.s.i. pressure change is about 1% of the piece weight.

The data in Fig. 11, below, show that increasing pressure consistently reduces shrinkage in both compression and plunger molding over a wide range of molding conditions; however, the magnitude of the effect of pressure is dependent on other conditions.

Ejection time: Where continued pressure is exerted on the sides of a piece by the cavity after molding pressure has been released. slower ejection rates tend to increase shrinkage because of less apparent elastic recovery and greater plastic deformation. This is shown, Fig. 12, below, by cooling curves run on bars molded in a positive mold with straight sides. Pieces ejected 11/2 sec. after the mold opened were 1.0 mil/in. longer than pieces ejected 10 sec. after the mold opened. This difference in dimensions due to differences in ejection time remained as the pieces cooled.

Piece cooling rate: The effect of cooling rate was studied by molding 1/8-in. bars of general-purpose phenolic under fixed conditions and controlling the cooling rate of each piece. The pieces were quenched immediately in an ice water bath, cooled in room temperature air, or kept in the mold and cooled gradually ("annealed") with pressure re-

Fig. 11: Effect of pressure on shrinkage. Molding conditions: general-purpose phenolic; preheat temp. 270° F.; piece 5-in. bar, ¼ in. thick

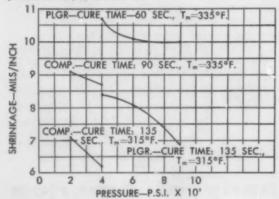
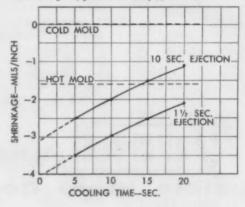
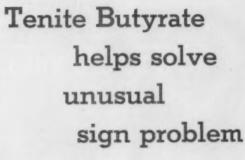


Fig. 12: Effect of ejection rate on shrinkage. Molding conditions: G-P phenolic; mold temp. 325° F.; preheat temp. 240° F.; cure 90 sec.; pressure 6000 p.s.i.; piece 5-in. bar, 1/4 in. thick









Eye formed from sheeting of Tenite Butyrate by Multiplastics, Addison, Ill., designer and builder of Turtle sold to Turtle Wax-Plastone Co., Chicago, by Victor Sign & Display Co., Inc., also of Chicago. Sheeting extruded by Midwest Plastic Products Co., Chicago Heights, Ill.

Three-foot eyes of Tenite Butyrate peer from the head of this 34-foot-high turtle, part of a seven-and-a-half story sign erected for the Turtle Wax-Plastone Company, of Chicago.

To solve the problem of forming so large a shape as these eyes, Multiplastics turned to Tenite Butyrate, a material that is easy to work with, long-lasting and attractive.

The choice was a logical one. Extruded sheet of Tenite Butyrate is a thermoplastic material, offering exceptional ease of forming by vacuum, air pressure, mechanical pressure, or combination of these. It is resilient, and virtually unbreakable in handling and in use. What's more, this versatile Eastman plastic retains its brilliant luster for years, even in severe climates. Its smooth surface permits dirt to flush off quickly in the rain, so that signs made of Butyrate

remain clean and fresh-looking indefinitely.

Tough and durable Tenite Butyrate is especially well-suited for sign construction. Its high impact strength and weatherability make it the ideal material for forming illuminated signs, as well as letters for theatre marquees and displays, large words and trademarks, cut-outs, facings, panels and backgrounds. Tenite Butyrate is also used in many other outdoor applications where rugged strength is required, such as football helmets, marine floats, oil-field pipe, and cable conduit.

Find out how you can benefit from the many advantages of Tenite Butyrate. For more information about its properties, uses, and ease of fabrication, write EASTMAN CHEMICAL PRODUCTS, INC., subsidiary of Eastman Kodak Company, KINGSPORT, TENNESSEE.

TENITE BUTYRATE an Eastman plastic

1932 - EASTMAN'S 25TH YEAR IN PLASTICS - 1957

Information regarding Tenite also can be obtained from local representatives listed under "Plastics—Tenite" in the classified telephone directories of the following cities: Atlanta, Chicago, Cleveland, Dayton, Detroit, Houston, Kansas City, Leominster (Mass.), Los Angeles, New York City, Portland (Ore.), Rochester (N. Y.), St. Louis, San Francisco, Seattle and Toronto—elsewhere throughout the world, from Eastman Kodak Company affiliates and distributors.

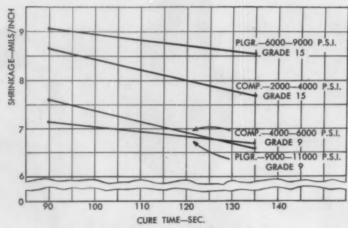


Fig. 13: Compression versus plunger molding. Molding conditions: general-purpose phenolic; mold temperature average over 325° F. and 360° F.; preheat temperature average over 210° F. and 270° F.; piece 5-in. bar, 1/4 in. thick

Table II: Mold and piece design factors

			Mechanism				
	Effect on shrinkage of			ermal action	Elastic recovery	Plastic deformation	
Principal variable	increasing variable	Secondary effect		Coeff. th. ex.	Pressure on piece	Mechanical distortion	
Flow pattern	Increase- decrease	Filler orientation		х			
Gate size	Decrease	Pr. on piece			X		
Cut-off (more pos.)	Decrease	Pr. on piece			х		
Depth of draw	Increase- decrease	Pr. on piece			х		
Thickness	Increase	Deg. of cure		х			

moved. Measurements showed that quenching increased shrinkage 12 to 14% for different general-purpose materials molded under different conditions, while annealing had no effect on shrink-

Compression versus plunger molding: To summarize the effects of the different molding variables on compression and plunger molding:

- 1) Prolonging the cure time decreases shrinkage.
- 2) Raising the mold temperature increases shrinkage.
- 3) Raising the preheat temperature reduces shrinkage.
- 4) Faster ejection increases shrinkage. 5) Higher molding pressures

principal mold and piece design factors, secondary effects, and

Table II, above, summarizes

result in a reduced shrinkage, except in plunger molding when the mold is flashed.

When the same materials were compression and plunger molded into identical pieces under similar conditions, shrinkages obtained in the two processes were nearly alike. This is shown by the curves in Fig. 13, above, showing shrinkage values averaged over different mold and preheat temperatures at each of two cure times for materials of two different plasticities.

Mold and piece design variables

each variable while holding the others constant, the following variations in shrinkage would occur: 1) Flow pattern-shrinkage in-

their respective shrinkage mecha-

nisms. If one were to increase

creases or decreases depending on the mold and piece design, charge placement, and filler orientation.

2) Gate size-shrinkage drops because of better pressure transmission and packing that in turn result in greater elastic recovery.

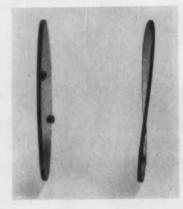
3) Type of cut-off-shrinkage decreases as the mold approaches "fully positive" because of greater effective pressure that causes more elastic recovery.

4) Depth of draw-shrinkage decreases from top to bottom of draw because of more pressure at bottom of mold giving greater elastic recovery at that point. Thermosetting materials do not transmit pressure hydraulically, and there is a pressure drop along the direction of flow.

5) Thickness-shrinkage creases as a result of a lower degree of cure which raises the coefficient of thermal expansion, causing more contraction as the piece cools.

Flow pattern and filler orientation: A very important aspect of mold design is the flow pattern obtained. The flow pattern largely determines filler orientation, which in turn has a profound effect on shrinkage. With generalpurpose, flock-filled, or asbestosfilled materials, shrinkage perpendicular to the direction of flow consistently greater than

Fig. 14: Effect of filler orientation on test disk





or call KEnmore 1-3040.



THE LEWIS WELDING & ENGINEERING CORP.

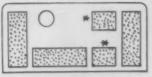
Machine Division

23002 St. Clair Avenue

Cleveland 17, Ohio

ibility of operation. Because of its extremely precise temperature control, it permits intermittent operation without flashing or burning . . . can operate at greatly decreased injection pressures and temperatures. In fact, MODEL "6P" is the first machine capable of molding the new lowpressure linear-type polyethylenes as well as other materials.

The LEWIS "6P" is more than an "improved" model . . . it is the most versatile production machine ever offered at competitive prices in the 8-ounce class.



STANDARD

shrinkage parallel to flow. For example, the shrinkages in the flat side walls of a compression-molded radio cabinet were found to be from 12 to 27% greater in the horizontal direction than in

the vertical (or flow) direction

over a range of molding condi-

tions and general-purpose ma-



SPECIAL PREFORMS ON END

Fig. 15: Standard and special charge placement for radio cabinet mold

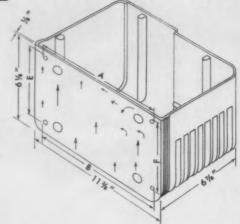


Fig. 16: Radio cabinet mold. Note flow pattern as indicated by arrows on face of mold

terials.

A vivid example of this phenomenon in Fig. 14, p. 120, shows the edge views of two disks. The disk on the right, which exhibits extreme "saddle warping," was prepared from filleroriented, rolled sheets. Two circular pieces were cut, placed on one another with their direction of filler orientation at right angles, and then joined by molding. The disk on the left was molded from granules of the same material

with no apparent warpage. Differences in flow pattern, and, therefore, in filler orientation and shrinkage, can be induced by varying charge placement as well as by differences in mold design. This was shown by experiments in both a 1- by 5-in. bar mold and a radio cabinet mold. When the charge was placed toward one end of the bar mold, instead of being distributed uniformly, the material was forced to flow along the length of the bar, resulting in a slight degree of orientation. This caused an 8% reduction in shrinkage in the bar length direction.

Bigger differences in flow pattern, and therefore in filler orientation and shrinkage, were possible in the radio cabinet mold as a result of charge placement. The diagrams in Fig. 15, above, show "standard" charge placement which results in fairly uniform flow up on all sides of the cabinet and the "special" charge placement employed to alter the flow pattern. The latter placement, in conjunction with the ribs in the bottom of the cabinet, tended to channel the flow of material up the right end of the cabinet and

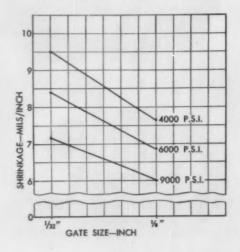
starve the front face. The result was that, in the upper right corner of this face on which measurements were made, the flow was more nearly horizontal than vertical, Fig. 16, above. This caused a reduction in shrinkage from 12.0 to 9.9 mils/in. in the horizontal dimension A. A corresponding increase in shrinkage from 8.2 to 10.3 mils/in. occurred in the vertical dimension F.

Gate size: Fig. 17, below, shows that it was found that an increase in gate size of a plunger mold usually resulted in less shrinkage. Presumably, this is due to better transmission of pressure across the gate and greater packing during cure.

Type of cut-off: In compres-

sion molding the pressure in a landed-positive mold is less than in a fully-positive mold operated under the same nominal pressure. Also, the difference in pressure between the two molds will be greater with softer materials. This means that greater shrinkage should be observed in the landed than in the full-positive mold and that the difference between the two should be greater for softer materials. This is fully borne out by the shrinkage observed in a 1by 5-in, bar mold when operated as a landed-positive mold and as a full-positive mold. The average shrinkage difference between the two molds was slightly over 1 mil/ in. Figure 18, p. 124, in which differences for the individual ma-

Fig. 17: Effect of gate size on shrinkage. Molding conditions: general purpose phenolic; mold temperature 315° F.; preheat temp. 270° F.; cure time average over 90 sec. and 135 sec.; plasticity grade 15; gate width ¼ inch





cut costs · save space · speed production with Allis-Chalmers dielectric heaters

Processing time measured in minutes . . . maximum production per unit of floor space . . . streamlined work flow . . . minimum heat loss . . . improved working conditions . . . simplified operation — these advantages are yours with the Allis-Chalmers dielectric heater.

If your processing requires the heating of non-conducting materials, the application of Allis-Chalmers dielectric equipment and engineering will mean faster production and lowered costs. The experience gained by Allis-Chalmers engineers in designing hundreds of dielectric and induction heating installations is available for your operations.

See your nearby Allis-Chalmers representative or write Allis-Chalmers, Industrial Equipment Division, Milwaukee 1, Wisconsin. Ask for bulletin 15B6431C.

ALLIS-CHALMERS



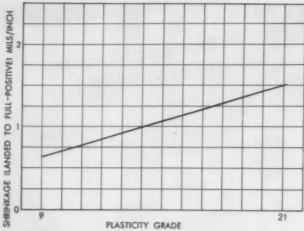


Fig. 18: Effect of type of cut-off and plasticity on shrinkage. Molding conditions: general-purpose phenolic; mold temperature 320° F.; no preheat; cure time 120 sec.; pressure 3250 p.s.i.; piece ½- by 1- by 5-in. bar

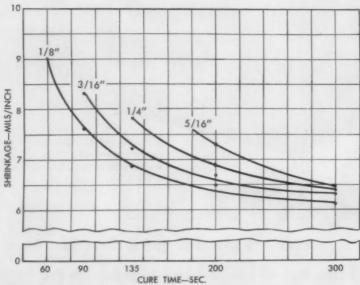


Fig. 19: Effect of thickness on shrinkage. Molding conditions: general-purpose phenolic; mold temperature 355° F.; no preheat; pressure 2000 p.s.i.; piece 1- by 5-in. bar

Table III: Material factors

	Effect on			rmal action	Mechanism— Elastic recovery	Plastic deformation
Principal variable	shrinkage of increasing variable	Secondary effect	Piece temp.	Coeff. th. ex.	Pressure on piece	Mechanical distortion
Plasticity	Increase			x	x	
Moisture	Increase			x		
Filler type	Increase- decrease			х		

terials are plotted against plasticity, shows that the effect of type of cut-off was less for the stiffer materials and increased with softening plasticity.

Depth of draw: The depth of draw of the molded piece is a factor that must be taken into account when shrinkage is being considered. It has been found that the pressure in a deep-draw mold is less at the top edge than at the bottom of the mold. As a result, somewhat more shrinkage will be noted at the top of the molded piece because of the reduced pressure that is exerted there.

Thickness: The effect of increasing thickness is to increase the shrinkage of a molded piece. This is due to the fact that the thicker sections heat more slowly, which reduces the degree of cure and increases the coefficient of thermal expansion, thus increasing the shrinkage of the molded piece. This is shown in Fig. 19, left.

Material factors

Table III, below, lists principal material factors, and their respective shrinkage mechanisms. If one increased each factor while holding the others constant, the following shrinkage variations would occur.

- 1) Plasticity shrinkage increases as plasticity becomes softer because softer materials have a greater thermal coefficient of expansion. In addition, the pressure in the mold with softer material is likely to be lower, which decreases the amount of elastic recovery.
- Moisture content—shrinkage increases because of an increase in coefficient of thermal expansion causing more contraction.
- Filler type—shrinkage increases or decreases depending on the effect the filler has on the coefficient of thermal expansion.

Plasticity: The influence of material plasticity on molding shrinkage was investigated. Comparisons were made in two landed-positive molds both with and without H.F. preheat. As in Fig. 20, p. 129, results showed batches of stiffer plasticity shrank less than did those of the same product having softer plasticity.

In other tests in which the same (To page 129)



Color, finish, and strength without bulk are features of BAKELITE C-11 Plastic that led to its selection for the upper case section of the Remington "Rollectric" shaver. Description on following page.

The source with the greatest variety

Helps you select the right plastic

Finding the best material for your plastic product can be greatly simplified by working with Bakelite Company. At this one convenient source, you can investigate the greatest variety of plastics and resins available. You can call on the advice and assistance of qualified technical representatives backed by unsurpassed laboratory facilities. And, for prompt delivery and service, Bakelite Company plants and warehouses are based in strategically located cities across the country. All these elements can contribute substantially to the success of your product.

Selecting the right plastic

(continued from preceding page)



C-11 Plastic crowns the newest Remington

Take a look at the upper section of the new Remington "Rollectric" shaver—the part that houses the cutting head and holds the new "Rollectric" steel roller combs. Notice the even color and fine finish. Strength without bulk is another of its qualities. All these features—strength, finish, color, and good molding details—are characteristic of BAKELITE C-11 Plastic.

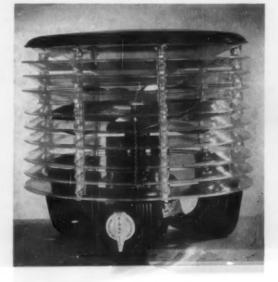
Bakelite Brand C-11, an acrylonitrile-styrene copolymer, is also notable for its superior chemical resistance. In this application, it is unaffected by perspiration. It also withstands attack by gasoline, turpentine, detergents, ink, coffee, carbon tetrachloride, and food acids and oils. As a result, Bakelite C-11 Plastic is being used for more and more applications in the housewares and packaging fields.

Strength and beauty above and below with BAKELITE Phenolic BMG-5000

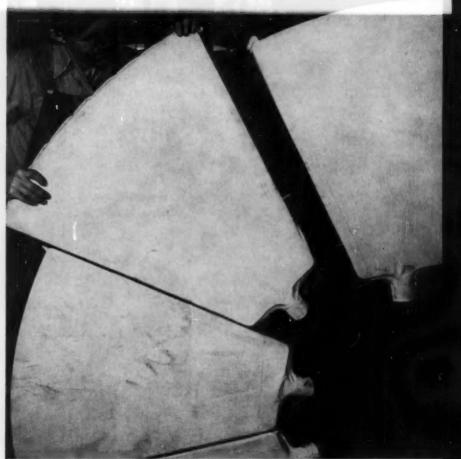
Where the treatment is the toughest—on the cover and base—the manufacturers of this electric hassock fan use parts molded of BAKELITE Brand Phenolic BMG-5000. They know that BMG-5000 keeps its eye-appeal—fine surface finish, rich color. In addition, it provides cleanly-molded details that emphasize the fan's quality construction.

BMG-5000 is a general purpose, two-step material formulated for the best combination of molding and end-use properties. Its specific gravity is low. With its broad molding latitude, excellent flow properties, and good hot rigidity, BMG-5000 can be molded on minimum cycle to produce pieces with high gloss and superior strength properties.

Parts molded by Cambridge-Panelyte Molded Plastics, subsidiary of St. Regis Paper Co., Cambridge, Ohio, for "Air Flight" Circulators manufactured by W. W. Welch Co., Cincinnati, Ohio.







(Left) Dressing disc filter sector with filter bag and (above) inserting sector in disc ring on filter. Filter bag is made of "Reevon" woven from monofilaments of BAKELITE Polyethylene by Reeves Brothers Inc., New York, N. Y. and used in Eimco Agidisc filters made by The Eimco Corp., Salt Lake City, Utah.

"Polyethylene cloth" filter bags outlast ordinary bags 12½ to 1!

Cloth woven from extruded monofilaments of BAKELITE Brand Polyethylene has been filtering molybdenum particles from slurry for six months—about 1000 working hours. It shows no sign of wearing out. The material used before lasted only 80 hours.

The manufacturer states that in this application, the polyethylene monofilaments have successfully withstood (1) the pull of the vacuum that draws the molybdenum particles against the filter, (2) the weight of the caked molybdenum, (3) the blasts of compressed air that loosen the cake, and (4) the continual wetting and drying as the filters rotate in and out of the slurry.

Besides saving replacement down-time, the fabric is nonblinding (pores won't clog), provides good discharge of the cake, and exhibits excellent chemical resistance.

One plastics source...

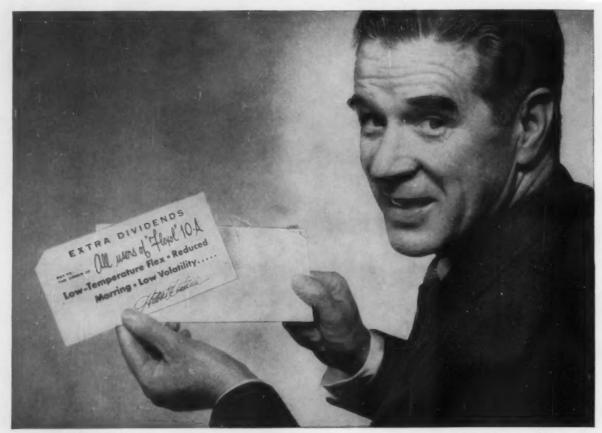


PHENOLICS
STYRENES
IMPACT STYRENES
POLYETHYLENES
VINYLS
POLYESTERS
EPOXIES

BAKELITE COMPANY, A Division of Union Carbide and Carbon Corporation 30 East 42nd Street, New York 17, N. Y.

In Canada: Bakelite Company, Division of Union Carbide Canada Limited, Belleville, Ontario

The term BAKELITE and the Trefoil Symbol are registered trade-marks of UCC.



FLEXOL Plasticizer 10-A pays extra dividends

CHEMICALS Carbide and Carbon Chemicals Company Union Carbide and Carbon Corporation 30 East 42nd Street 114 New York 17, N. Y

In addition to superior low-temperature flexibility, FLEXOL Plasticizer 10-A (didecyl adipate) also gives you these extras-low volatility, good resistance to water extraction, and excellent heat and light stability. And FLEXOL 10-A is the best of the low-temperature plasticizers in its comparative freedom from

FLEXOL Plasticizer 10-A is widely useful in the vinyl plastics industry in calendered film and sheeting, electrical insulation compounds, profile extrusions, slush moldings, and dip coatings. It is a good plasticizer for nitrocellulose and a softener for natural or synthetic rubber.

Learn about the extra dividends paid by FLEXOL 10-Afill in and mail the coupon for your sample and technical information. In Canada: Carbide Chemicals Company, Division of Union Carbide Canada Limited, Montreal and Toronto.



CARBIDE AND CARBON CHEMICALS COMPANY

A Division of Union Carbide and Carbon Corporation

30 East 42nd Street, New York 17, New York

Please send me a sample and technical information on FLEXOL Plasticizer 10-A. Name......Title....

The term "Flexol" is a registered trade-mark of Union Carbide and Carbon Corporation.

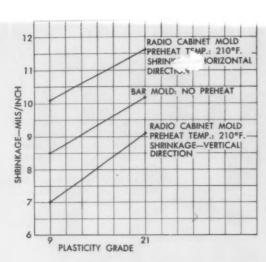
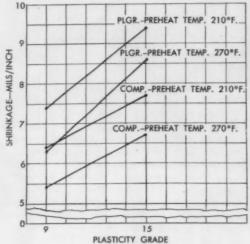


Fig. 20: Effect of plasticity and preheat in two different compression molds. Molding conditions: general - purpose phenolic; mold temp. 320° F.; cure time 120 sec.; pressure 3250 ps.i.; thickness ½ inch

Fig. 21: Effect of plasticity on shrinkage. Molding conditions: general-purpose phenolic; mold temp. 315° F.; cure time average over 90 sec. and 135 sec.; pressure (compression) 4000 p.s.i.; and (plunger) 9000 p.s.i. for grade 9 and 6000 for grade 15; gate size ½ in.; piece ¼ in. thick bar



material was used in a fully-positive compression mold and a plunger mold, the softer material consistently resulted in higher shrinkages. As shown in Fig. 21, above, effect of plasticity was greater in plunger molding. This is due to the fact that, while both plasticities were compressionmolded at the same pressure, in the plunger mold the softer material had to be molded at a reduced pressure to avoid flashing. This is a situation frequently encountered in plunger molding. For landed compression molds, for a given applied pressure, the effective pressure on a material decreases with softening plasticity because the softer materials escape more readily from the mold. This is illustrated in Fig. 18.

Moisture content: The moisture content of a molding material as it enters the mold is related directly to preform temperature. An example of the amount of drying that results from different preheating methods and varying preheat temperatures is shown in Fig. 22. At any given preform temperature, air gave a drier preform than did superheated, 1-atm. steam. In fact, during the initial stages of heating, some of the steam is actually condensed on the preform, increasing its water content. A hidden factor here is time: to reach a given preform temperature takes longest with air, less long with steam (primarily because initially condensing steam gives up latent heat), and much less with H. F. preheating. Thus, there is more time for the water in the preform to diffuse out when air heating is used than with steam. With H. F. preheating, the time for diffusion is cut very short. This time factor also accounts for the at-first startling result that air at 195° F. gives a drier preform than air at 230° F., when preform temperature exceeds 180° F. The temperatures of the preforms were measured with a needle-type pyrometer having a very thin needle that was deeply embedded in the preform along a radius of the mid-section. This temperature is fairly representative of that obtaining in the main bulk of the preform.

The shrinkage versus cooling time curves in Fig. 23, p. 130, show an increase in moisture content results in greater shrinkage by increasing the thermal coefficient of expansion and point up the importance of moisture content of a molding material at the time of molding. Note also that the very hot preheat of 270° F. completely erased the effects of humidifying the "as made" material. Of practical significance is the fact that

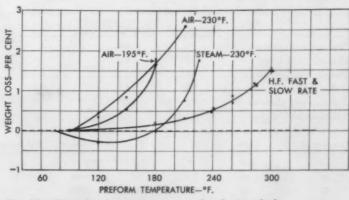
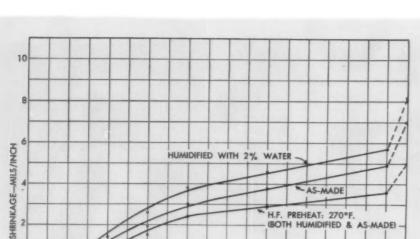


Fig. 22: Effect of preform temperature and preheat methods on moisture loss. Molding conditions: general-purpose phenolic; preform size $1\frac{1}{2}$ -in. diameter by 1 in. high



COLD WOLD HOT MOLD 100

COOLING TIME-SEC.

Fig. 23: Effect of preheat and moisture content on shrinkage. Molding conditions: general-purpose phenolic; mold temp. 325° F .: preheat temp. none and 270° F.; pressure 2000 p.s.i.; piece 1/4- by 1/2- by 5-in.

these materials are hygroscopic. For this reason, the materials are packed in moisture-resistant containers by the manufacturer, and they should not be exposed to air by the molder unnecessarily.

Shrinkage mechanisms were studied for widely different types of materials. These materials, which were compression molded, include: heat-resistant phenolic, mineral-filled alkyd, glass-filled silicone, and general purpose onestep, general-purpose two-step, and rubber-modified phenolic.

Typical results obtained at two different conditions with compression molding are listed in

Table IV, below. Note, although the levels are slightly different, the relative shrinkage of the various materials were very nearly the same for both conditions (A and B), and that these agreed generally with the published values based on the A.S.T.M. test. These differences resulted primarily from differences in thermal coefficient as a result of filler type (mineral versus woodflour) and to some extent on resin type. Note that the shrinkage of the one-step and the two-step general-purpose phenolics were nearly the same.

- AS-MADE

140

H.F. PREHEAT: 270°F.

160

It was found in compression molding that the effects of the

molding factors on the shrinkage of these materials were in general conformity with the findings just discussed for general-purpose phenolics. That is:

1) Higher mold temperature increased shrinkage with the exception of the silicone which exhibited a slight decrease.

2) Higher preform temperature decreased shrinkage with the exceptions of the silicone and alkyd materials, essentially unaffected by preform temperature.

3) Longer cure time decreased shrinkage for all materials.

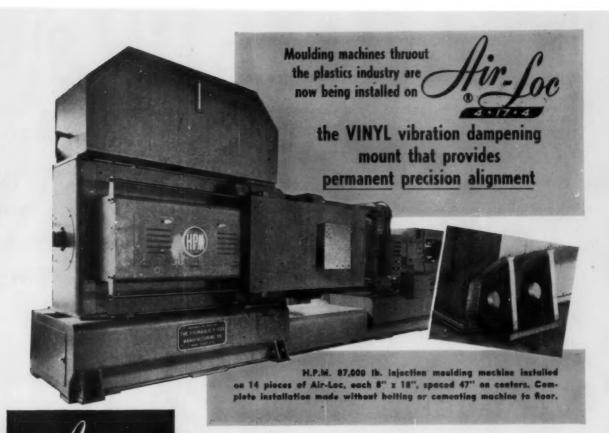
4) Higher molding pressure decreased shrinkage for all materials.

Conclusion

From the foregoing, it is inherently evident that the control and achievement of molding dimensions depends on the material manufacturer, mold designer, and the molder. It is the responsibility of the material manufacturer to supply materials, quality controlled for uniformity of properties. The mold designer must be familiar with the behavior of the materials to be used in the mold. The molder must maintain constant and proper molding conditions. Only through the cooperation of all concerned can a finished molded product of required dimensions be produced most economically.

Table IV: Comparative shrinkage of various thermosets

Material		Condition A	Condition l	B A.S.T.	M.(D955-51)
Heat-resistant phenolic		4.9	4.3		4
Mineral-filled alkyd		4.9	3.6		4.5
Mineral-filled silicone		6.1°	5.0°		-
G-P one-step phenolic		7.5	6.7	6.0	
G-P two-step phenolic		8.5	7.2		6.0
Rubber-modified phenolic		10.0	8.5		8.0
Conditions	Cure	T_p	T_m	Pressure	Thickness
	sec.	°F.	°F.	p.s.i.	in.
A	90	210	355	4000	.250
В	90	210	315	6000	.250
A.S.T.M.	180	_	310	2540	.125



is the only Vinyl mount that gives

- Permanent precision installation without bolting or cementing.
- 2. Complete resistance to oil, water, alkali, etc.
- 3. Easy precision shimming for quick leveling.
- Low initial cost and no maintenance cost. (You can re-use Air-Loc mounts.)

Reduce transmitted noise and vibration from moulding machines with patented <u>Air-Loc</u>. Return the coupon for a free sample and complete information.

RETURN COUPON FOR A SAMPLE OF AIR-LOC AND COMPLETE INFORMATION. AIR-LOC DIVISION CLARK, CUTLER, McDERMOTT CO., Franklin, Massachusetts
Please send a sample of Air-Loc for moulding machine installation:

Company Zone State

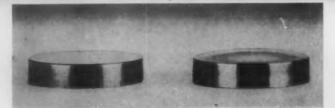
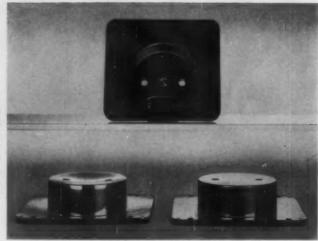


Fig. 1: Molded phenolic screw caps for jars. Cap at right exhibits doming typical of unvented mold; cap at left was molded in vent-valved mold

Fig. 2: Compression molded instrument cases made in mold where combination of no draft and good finish caused a partial vacuum as case was removed from male member of mold. At left, sunk case made in unvented mold; at right, case made in vented mold; at top, inside view of case at right. (Illustrations, Insulation Mfg. Co.)



Vent-valve for compression molds

A tiny valve built into molds will eliminate bulging and sinking of molded parts due to trapped gas or unrelieved suction

By G. W. Wilcox*

N molding thermosets, certain volatiles diffuse out and spring from all surfaces of the molding as the molding pressure is taken off the piece. From those surfaces of the piece that are exposed to the air, the gases simply pass into the atmosphere. But gases evolved from those surfaces which are still in contact with the mold are trapped and tend to push the piece away from the metal surfaces of the mold. If the piece is free to move, as most pieces are, the piece will ease away from the metal before enough gas pressure develops to cause distortion. But if the piece is restrained, say by

threads or undercuts, thin largearea regions may be stretched and bowed out by the gas pressure. The vent-valve described here, if located in the mold under these thin areas, will permit the gas to escape preventing pressure buildup and consequent distortion.

The distortion from gas pressure is most apt to take place on 1) parts requiring side cores to be pulled before the part is released from the cavity or plug; 2) parts which are heavily undercut to make them stay either in the cavity or on the force until pushed off by knockout pins; 3) parts which must be unscrewed from the force or cavity; and 4) deep moldings with draftless walls

under which a vacuum is created as they are withdrawn from the mold.

Typical examples

Plastic bottle or jar caps (see Fig. 1) are classic examples of parts where trapped gases often cause distortion — sometimes called "doming." The degree of doming increases with increasing area of the cap and unscrewing time, but decreases as the top is made thicker. If the cap is unscrewed from its plug the same instant that the pressure of the cavity is removed, no doming will occur but this exact timing is often difficult to achieve. Vent valves have been very successful

^{*}Durez Plastics Div., Hooker Electrochemical Co., N. Tonawanda, N. Y.

locked-in protection for electrical properties



DAPON resin

superior moisture resistance

Completely protected and locked-in—the excellent electrical properties inherent in cured DAPON resin are protected by the resistance of DAPON resin to moisture in all forms.

DAPON resin is the *new prepolymer* of diallyl phthalate—a dry white powder with improved properties. It is *easy to handle and store*. Its advent has made possible the use of diallyl phthalate in *all processing methods* for thermosetting resins.

Because the cure of DAPON resin involves addition polymerization, and not condensation, moisture formation is non-existent during cure.

Think of an electrical connector with volume resistivity higher than that of porcelain with complete protection that guarantees the retention of these properties under the most adverse conditions. This is DAPON resin.

Rid yourself of the moisture problem. Be assured of locked-in initial properties and locked out moisture. Write now for technical literature containing properties, uses and methods of application for DAPON resin.

Molding compounds containing DAPON resin are produced by Acme Resin Corporation, Durez Plastics Division, and Mesa Plastics Company.

OHIO-APEX DIVISION

Food Machinery and Chemical Corporation Nitro, West Virginia Department 58





FMC CHEMICALS INCLUDE: WESTVACO Alkalıs, Chlorinated Chemicals and Carbon Bisulfide • BECCO Peroxygen
Chemicals • NIAGARA Insecticides, Fungicides and Industrial Sulphur • OHIO-APEX Plasticisers and Chemicals
EAREFFLD Posicide Companyede and Organic Chemicals • WESTVACO Physikates Barium and Manuscium Chemicals

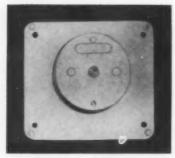


Fig. 3: Male member of mold used in making instrument case shown in Fig. 2, with vent valve located in the center of the flat region

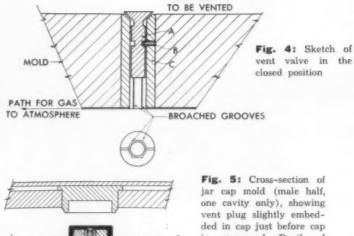
in eliminating doming of screw caps, and have greatly reduced reject rates at Colt's Plastics Co., Inc., for example, where many have been used for some time.

A kind of inverse doming occurs in some moldings, such as the instrument housing of Fig. 2. In this molding, it was found that the fit between the male half of the mold and the molding was so snug that a partial vacuum was created as the molded case was withdrawn from the male half. The higher pressure outside tended to bulge the bottom of the case inwards, as in the sample at the lower left. A vent-valve mounted in the male half of the mold (see Fig. 3), permitted quick equalization of pressure as the plug was withdrawn, eliminating the inward sinking. The flatness of the bottom of the vented molding shows in the lower right case of Fig. 2, while the case at the top shows the mark made in the inside face of the bottom by the vent valve head.

Construction of valve

The Durez vent valve is sketched in Fig. 4. It consists simply of a poppet valve (A) mounted in a sleeve (B) so that when in closed position the head of the poppet valve stands above the end of the sleeve so that it forms an undercut. The set screw (C) has a tip which rides in a ring groove in the stem of the poppet valve. The groove and setscrew tip are so sized that the poppet valve will lift about 4 mils.

The vent valve is inserted as a



MOLD SURFACE

jar cap mold (male half, one cavity only), showing vent plug slightly embedded in cap just before cap is unscrewed. Depth of embedment, exaggerated here, is only 10 mils

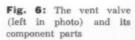
unit, in the center of the force plug of the jar cap mold as shown in Fig. 5. The end of the sleeve is set flush with the surface of the force plug. This arrangement makes the head of the poppet valve stand up above that surface about 10 mils, forming an undercut recess on the inside of the cap. When a cap is molded in this cavity, the head of the poppet valve becomes embedded slightly in the inside of the cap. As the mold is opened, if the cap starts to bulge, the very bulging of the cap simultaneously lifts the valve and allows the gases to escape down the broached grooves provided in the inside o, the sleeve. When the cap is unscrewed the head of the valve easily strips out of its undercut recess. The cap has bulged usually about 2 mils but for most jobs this is considered sufficiently flat.

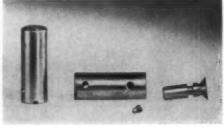
Figure 6 is a photo of an essembled valve together with its three component parts.

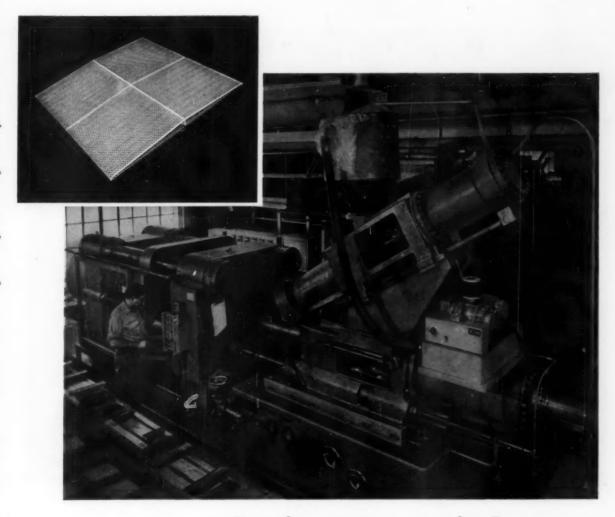
The vent plug unit is inserted in a straight hole just tightly

enough so that it can be tapped in lightly with a hammer handle. If the vent plug is used on a threaded piece, like a jar top, its axis must be concentric with the thread for unscrewing. The end surface of the sleeve must be flush with the surface to be vented. The vent plug is equally successful with loose powder or preforms. It may be mounted in top or bottom of the mold. Of course, a path must be provided to allow the gases to pass between the open end of the sleeve and the atmosphere. The head of the valve necessarily leaves a blemish on the molded part but usually on the inside where it can be tolerated.

The Durez Plastics Div., Hooker Electrochemical Co., has a patent pending on this device and is authorizing certain concerns to produce and sell vent valves to any molders who want them. Several hundred valves have been produced, some of which have been in successful service for more than a year.







Two-foot square, acrylic lenses precision molded on Watson-Stillman 200 ounce machine

The fine prismatic pattern and thin cross section embodied in Holophane's acrylic plastic Controlens*, call for precise molding control. Uniform heat to assure the right degree of plasticity, proper control of shot thickness and injection pressure, as well as uniformity in material, are a few of the demands made on this 200 ounce Watson-Stillman injection molding machine.

Many advanced design features contribute to the fine quality molding delivered by the machine. Among these are a new heating cylinder which provides efficient heat transmission plus high plasticizing rates; and a preplasticizing unit that shortens the molding cycle and increases the capacity of the machine.

The new acrylic plastic lenses give light control in all directions. They have optical brilliance, are strong but light in weight and resist breakage. What's more, the lenses make it possible to provide illumination intensities up to three hundred footcandles - without visual discomfort.

Perhaps Watson-Stillman can help increase your molding quality - help meet your production objectives. Write today for full details on Watson-Stillman injection molding machines.

WATSON-STILLMAN PRESS DIVISION

FARREL-BIRMINGHAM COMPANY, INC.

150 Aldene Road, Roselle, New Jersey Plants: Ansonia and Derby, Conn., Buffalo and Rochester, N. Y. European Office: Piazza della Republica 32, Milano, Italy Represented in Canada by Barnett J. Danson, 1912 Avenue Road, Toronto, Ontario

OTHER FARREL-BIRMINGHAM PRODUCTS FOR THE PLASTICS INDUSTRY: Banbury Mixers . Roll Mills . Calenders • Extruders • Vertical Injection Molding Machines . Transfer Molding Machines . Compression **Molding Machines**



*Trademark of Holophane Co

"Trial Without Error" Is Achieved By Plastic Tooling With Marblette Resins



Developmental work with conventional metal tools is extremely time-consuming, involves skyhigh costs when designs must be changed. By contrast, quickly made plastic dies of Maraset* resins can be readily and repeatedly recast at minimum expense until the final design is proved and production can be scheduled.

Savings up to 80% in time and labor are among the reasons why Marblette resins are used in plastic tooling by the automotive, aircraft, and other industries—for production tools as well as developmental ones. Such dies often form as many as 20,000 or more parts before being refaced and promptly put back to work.



FREE!

The "Marblette Digest of Plastic Tooling"—an information-packed pamphlet with "at a glance" facts about the versatile line of Marblette and Maraset resins and their uses. To obtain your copy, or for Marblette production aid and technical assistance—

Write, wire, or phone today!

Marblette

37-17 Thirtieth St., Long Island City 1, N. Y. Telephone: STillwell 4-8100

CHICAGO • DETROIT • LOS ANGELES • MONTREAL
WICHITA • HAVANA

*Maraset is the new registered trade mark for the Marblette line of superior epoxy resins for casting, laminating, potting, trowelling, sealing, and other uses. These are resins maintaining the high standards of quality and performance set by liquid and cast phenolic resins supplied by Marblette since 1929.



High-shear-rate

Rheological properties of plastics

By Arnold C. Werner†

An inexpensive and conveniently operated extrusion-type viscometer is available to the plastisol industry. This viscometer has been primarily designed to measure viscosities at shear rates much higher than has been possible with more popularly used rotational viscometers. This allows accurate predictions of the application behavior of a plastisol under high shear conditions without resorting to costly plant trials.

This paper reviews and expands upon work previously reported (4)¹ and also discusses recent work on the measurement of high-shear rheological properties of plastisols. A review of the operation of the Severs Extrusion Rheometer and the mathematical basis for the calculations are presented. To facilitate the every-day use of this instrument, sample calculations are included. Methods of plotting flow curves and interpretation of data are discussed. Evaluations of various plastisol resins, plasticizers, and fillers are shown.

Data are also included on the use of the Severs rheometer to measure low shear rate viscosity properties and these are compared with data obtained with a low-shear viscometer (Brookfield).

of an estimated 28 million lb. of plastisol resin used in this country in 1955 (1)¹, about 12 million lb. were used in applications involving high shear rates. Typical applications include knife and reverse roll coating of paper for book covers and coating of cloth for furniture and automo-

tive upholstery, spraying of plastisols for tank linings, and coating on wire and other filaments.

Measurement of the rheological properties of plastisols used in these applications is of great importance in selecting resins and formulations that will be best suited for the application. Some recent papers (2, 3) have covered the use of low-shear-rate viscometers in plastisol work. The object of this paper is to review a method for determining high-shear-rate rheological properties,

discuss these properties in terms of application behavior, and present practical formulating data.

Severs extrusion rheometer

The Severs extrusion rheometer, (Fig. 1, p. 138), developed by Dr. E. T. Severs, provides us with a simply constructed, rugged viscometer capable of developing high shear rates. A wide range of viscosities can be measured over a wide shear rate range using only a series of different sized orifices and a pressure controlling device.

The development of high shear rates with the Severs rheometer, in the laboratory, will allow one to predict the application behavior of a plastisol under the same high shear rate conditions encountered in the actual plant coating operation.

While there are rotational-type viscometers capable of developing high shear rates in the range usually encountered in high shear work, they are generally expensive.

The theory and operation of this rheometer have been previously covered (4). In review, the plastisol is poured into the reservoir (Fig. 2, p. 138). Air or gas

<sup>Reg. U. S. Pat. Off.
Paper presented at the S.P.I. Film,
Sheeting, and Coated Fabrics Div. Conference, New York, Dec. 4-5, 1956.
Marvinol Product Development and Sales Service Group, Naugastuck Chemical, Div. of U. S. Rubber Co.
Numbers in parentheses link to references at end of article, p. 234.</sup>



Fig. 1: Severs extrusion rheometer in operation

pressure introduced into the upper portion of the cylinder forces the plastisol to flow through the orifice. The discharged plastisol is collected in a tared container, and the run time is measured in seconds.

Using the efflux rate in cc./sec., the applied pressure, and the orifice dimensions, it is possible to calculate the shear rate, shear stress, and viscosity. The calculations are reviewed at the end of this article.

Flow curves

In Fig. 3, right, several flow curves common to plastisol systems are shown. Dilatant flow (Figure 3A) is characterized by a rapid increase in both shear stress and viscosity with increasing shear rate.

Plastisols exhibiting "Newtonian" flow, at least in the shear rate range covered, give stress curves that are essentially straight lines (Figure 3B) passing through or near the origin when extrapolated. The corresponding viscosity curve would be a straight line parallel to the shear rate axis, i. e., constant viscosity over a wide shear rate range.

Some plastisols exhibit slight thixotropy at high shear rates (Figure 3C), and a drop off in the viscosity values at increased shear will occur. The lower shear rate portion of this curve may be in the "Newtonian" flow region.

Combinations of different flow properties are also possible within

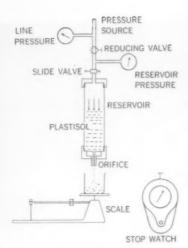


Fig. 2: Schematic of Severs extrusion rheometer

the range of shear rates measured. In Figure 3D, a plastisol is shown which exhibits dilatancy (i. e., an increase in viscosity with increasing shear) up to a critical shear rate. Beyond this point the viscosity remains constant over a narrow shear rate range; then, as the shear rate is further increased, a thixotropic effect is noted. It has been postulated that this type of flow curve is a result of the summation of opposing flow properties.

The causes of these various flow properties have been previously discussed by others (5, 6). If a plastisol is considered to be made up of polyvinyl chloride particles surrounded by plasticizer which is lightly bonded to the resin particle, it may also be theorized that at a critical shear rate this sphere of attached plasticizer elongates in the direction of flow. This streamlining effect at the critical shear rate may then overcome the dilatancy that has predominated up to this point.

Problems of dilatancy

High viscosity due to dilatancy in plastisols can be very troublesome in many industrial uses.

A spread-coating plastisol exhibiting dilatancy will cause difficulty in maintaining the proper clearance between the coating knife and web. Excessive tension placed on a fabric in order to maintain the required clearance between the web and knife will cause the fabric to distort. As dilatancy becomes more severe, the web will "chatter," and the cloth may be left devoid of coating in spots. In reverse roll coating, increased viscosity due to dilatancy will increase the power requirements of the coating equipment and will tend to cause "splitting."

Pumps are sometimes used to circulate plastisols in slush molding and in automotive caulking work. The plastisol may be subjected, in the pump, to shear rates

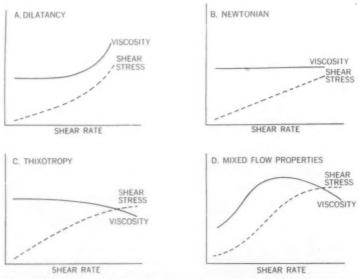


Fig. 3: Rheograms of various flow properties measured by Severs rheometer

that are sufficiently high to put the plastisol in the dilatant region. Consequently, the pump will operate with poor efficiency and generate excessive frictional heat.

In spray coating, high rates of shear usually are developed in the spray nozzle. Any tendency toward dilatancy in a plastisol used in this way will seriously interfere with its sprayability. This is an especially important consideration with the present emphasis on 100%-solids spray plastisols.

In the preparation of plant-size batches of plastisols using lowspeed mixers it is desirable and sometimes necessary to keep the plasticizer level as low as possible in order to keep the mix in a stiff condition.

This is done to obtain effective dispersion of the resin agglomerates and complete wetting down of the resin particles. Dilatant resins have been known to snap the mixing blades off heavy duty mixers while the paste was in the thick, undiluted stage. This is essentially a low-shear phenomenon, but the behavior of plastisols in this respect can be predicted from high-shear data, as is discussed later.

Shear rate calculations

The shear rate in a limited sense is a measure of the speed of an operation. It is dependent on the geometry of a coating system. The calculation for shear rate in a simple knife-coating operation will serve as an illustration. The shear rate is the ratio of the speed to the clearance. If, for example, the speed of the cloth being coated is 30 yd./min. and the clearance between the cloth and knife is 10 mils, the shear rate is:

$$\frac{30\times3\times12}{60}\times\frac{1000}{10}=1800~\text{sec.}^{-1}$$
 (in./sec.) (in. of (shear rate) clearance)

This calculation is based on the calculation for the shear rate of a fluid between two paralleled planes, one fixed and one moving at a given velocity. This differs from the calculation of shear rate through an orifice which is based on Poiseuille's law. Dimensionally, the shear rate units in either

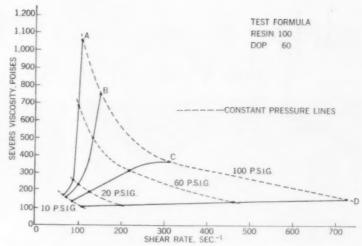


Fig. 4: Plot of viscosity versus shear rate, with equal-pressure lines

case come out in reciprocal seconds.

The shear rate, then, provides us with a tool that allows for the direct comparison of laboratory viscosity data with actual production experience.

Plotting data

In Fig. 4, above, four plastisols exhibiting varying degrees of dilatancy are plotted. The equal-pressure lines or isobars are superimposed on the viscosity-versus-shear rate plot. From this graph it can be seen that by com-

paring viscosities of the different plastisols at equivalent pressures, we are actually making this comparison at completely different rates of shear.

Since the speed of the web relative to the coating head and the clearance determine the shear rate in spread-coating applications, the most useful comparison of Severs data for different formulations will be made at equal shear rates rather than equal pressures.

In Fig. 4, it can also be seen that equal-pressure comparisons

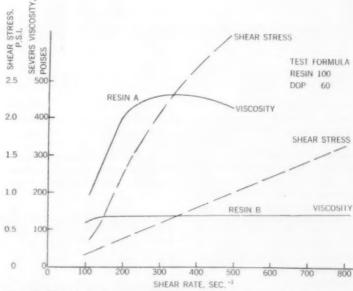


Fig. 5: Plot of shear stress (PR/2L) and viscosity versus shear rate for two different types of flow

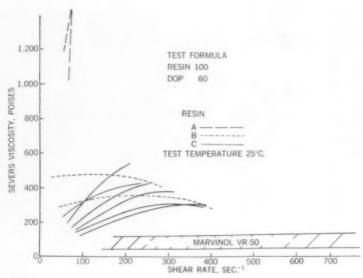


Fig. 6: Evaluation of various plastisol resins with Severs rheometer

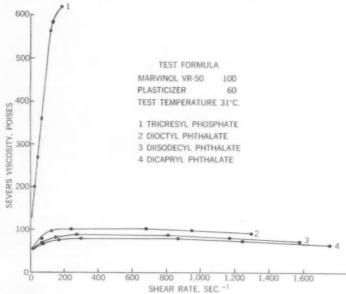


Fig. 7: Severs evaluation of various plasticizers with Marvinol VR-50

minimize to a very great extent the viscosity differences that actually exist at the coating head. It is possible to make viscosity comparisons at equal pressures by directly observing the experimental data obtained with the Severs. Viscosity comparisons at equal shear rates can be made only after the experimental data have been plotted (as in Fig. 4). The more useful comparison obtained in this manner more than compensates for the additional step involved.

A typical example is shown in the tabulation at right. In this tabulation the viscosities of plastisols B and C appear very similar when merely tabulated at 20 p.s.i.g. However, when their viscosities are compared at equal shear rates the viscosity of plastisol B is more than double that

of plastisol C due to the much higher degree of dilatancy in plastisol C. This is the difference that will actually show up at the coating head.

The question of plotting shear stress or viscosity versus shear rate can also be raised. In Fig. 5, p. 139, two plastisols are shown with both the shear stress and viscosity plotted against the shear rate. Note that the viscosity versus shear rate plot more dramatically shows up the rheological properties of this sample over the shear rate range investigated.

From the shear stress curve of resin A, it may not be obvious that the viscosity levels off at 250 sec.⁻¹. The viscosity-versus-shear rate plot shows this very clearly.

Plastisol resin

Several plastisol-grade polyvinyl chloride resins available on the market were evaluated for their high shear rheological properties (1). Wide differences in flow behavior were evident. In Fig. 6, above, note the high viscosity and dilatancy of resin A. Resin B gave an unusual flow curve. At low shear the viscosity was high and dropped slightly as the shear rate was increased. Lots of resin C varied over a wide viscosity range showing the necessity for careful selection when a resin is highly variable with respect to high shear rheological properties.

Marvinol² VR-50, a plastisolgrade polyvinyl chloride, was developed to produce a resin giving extremely low viscosities over a wide shear rate range without sacrificing other desirable properties.

Filler and plasticizer evaluations

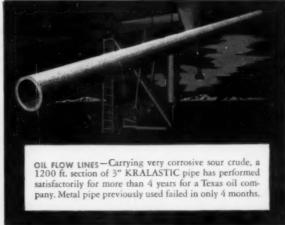
Once a resin best suiting one's high shear rheological needs has been selected using the Severs

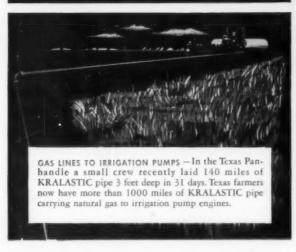
Trademark of Naugatuck Chemical.

Plastisol	Viscosity at 20 p.s.i.g.	Shear rate at 20 p.s.i.g.	Viscosity a 125 sec1
	poises	sec1	poises
В	235	100	400
C	190	125	190

KRALASTIC Corrosion-Proof Pipe Makes Good in Many Fields!









KRALASTIC[®], a unique combination of plastic and elastomeric materials, is different both in composition and physical properties from other materials used in the making of plastic pipe. It produces pipe—and many other plastic products—that are both hard and tough, low in weight, high in tensile strength and unaffected by most chemicals that corrode metals.

Pipe extruded of KRALASTIC has been approved by the National Sanitation Foundation for underground water transmission lines. Because of the inert nature of KRALASTIC, this pipe will not add taste or odor to drinking water and will not corrode and scale internally to cut down flow and pressure. For more information on KRALASTIC, write or phone us.



United States Rubber

Naugatuck Chemical Division

Naugatuck, Connecticut

BRANCHES: Akton • Boston • Gastonia, N.C. • Chicago • Los Angeles • Memphis • New York • Philadelphia • IN CANADA: Naugatuck Chemicals, Elmira, Ontario Rubber Chemicals • Synthetic Rubber • Plastics • Agricultural Chemicals • Reclaimed Rubber • Latices • Cable Address: Rubexport, N. Y.

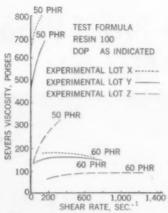


Fig. 8: Plot showing reduced-plasticizer effect on Severs viscosity

rheometer, the Severs then offers a means by which to evaluate plasticols with various fillers and plasticizers.

In Fig. 7, p. 140, four commonly used plasticizers have been evaluated with Marvinol VR-50 (1). Dicapryl phthalate, diisodecyl phthalate, and dioctyl phthalate all give the same low viscosity properties at high shear, a desirable feature for any high speed application. Of the four plasticizers studied, tricresyl phosphate gives dilatant flow properties which can be minimized by blending with other plasticizers and through the use of diluents.

Plastisol resins that have low high-shear viscosities show excellent mixing-in properties when compounded in heavy-duty-type mixers. Figure 8, above, shows how the viscosity properties of three plastisol resins in the test formula used enter a critical region as the concentration of DOP is reduced from 60 to 50 parts per hundred of resin (PHR) (1) (for other plasticizers the critical region may be at a different plasticizer level). These data indicate that Severs evaluations made at low plasticizer levels may offer a way of predicting plant compounding behavior of a plastisol resin or a plastisol formulation.

In Fig. 9, above, the simple test formula has been modified with varying amounts of filler (1). As the proportion of filler is increased, the dilatant effect becomes more pronounced. How-

ever, the viscosity does level off, although at correspondingly higher shear rates.

This type of data obtained with the Severs rheometer can be highly informative in formulating plastisols for high shear rate applications.

Proprietary formulations

Practical formulations rarely as simple as the 60 PHR DOP formulation used for general evaluation work. However, once a correlation is established between the simple formula and a proprietary formulation, it may be possible to determine the suitability of resins using the simple formula only. Using the simple control formula may also offer a much less cumbersome testing procedure by avoiding the necessity of making up a proprietary formulation complete with pigments, stabilizers, fillers, various placticizers, etc.

Such test data would, of course, only apply to the high shear properties of a resin. The low shear properties, reflecting for example, plastisol "strike through," adhesion to fabrics, and slush molding properties, would have to be measured by low shear instruments. Present indications are that any correlation at low shear between simple and proformulations prietary probably have to be established

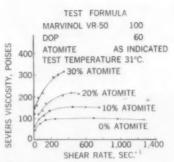


Fig. 9: Severs evaluation of varying filler concentrations in plastisol, useful in formulating for higher shear-rate applications

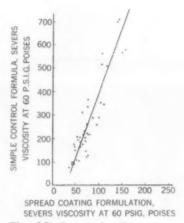


Fig. 10: Severs viscosity of a spread-coating formulation versus a simple control formula

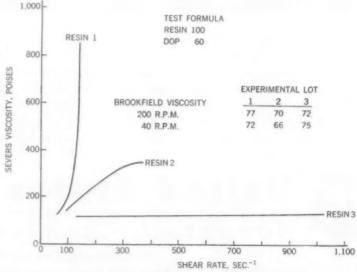


Fig. 11: Low-shear versus high-shear viscosity measurements

CYANAMID

CORROSIONEERING with LAMINAC®

Reinforced Laminac needs no maintenance in over three years of highly corrosive service

Here's dramatic evidence of the durability of glassreinforced LAMINAC polyester resin in highly corrosive service!

In venting systems for alum evaporators and digesters at Cyanamid's Warners, N. J., plant, carbon steel breeches and stacks required frequent maintenance, failed after two or three years of service.

Breeches and stacks molded of reinforced LAMINAC resin by Carl N. Beetle Plastics Corporation were installed as replacements. In the 84' stack installation, pictured at right, reinforced LAMINAC has served for more than three years without maintenance!

And long service life is only one advantage. Two 84' stacks, supplied in six sections, were installed with telescope-type joints, wrapped and cemented at the site. Another 82' stack, supplied in two sections, was installed with flange-type joints. Lighter by far than steel, the reinforced LAMINAC stacks were much easier to install, and cost considerably less in the long run.

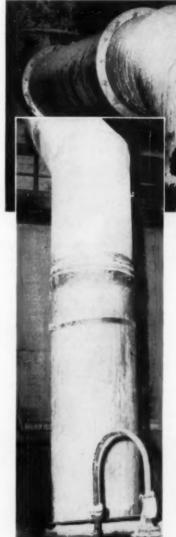
If your problem is handling corrosive fluids or fumes, glass-reinforced Laminac can help you reduce maintenance, extend service life and reduce costs. Consult your Cyanamid representative on the "whatto-use" and "how-to-use-it" of Laminac polyester resins.



AMERICAN CYANAMID COMPANY PLASTICS AND RESINS DIVISION 32 Rockefeller Plaza, New York 20, N.Y.

In Canada: North American Cyanamid Limited, Toronto and
Montreal

Offices in: Boston · Charlotte · Chicogo · Cincinnati · Cleveland Dallas · Detroit · Los Angeles · New York · Oakland · Philadelphia St. Louis · Seattle



Carbon steel breeching, 31.6" thick, in this alum evaporator at Cyanamid's Warners plant failed after 3 years, was replaced with reinforced LAMING.

An 84' stack of reinforced Laminac resin, ¼" thick, in even more severe alum digester service, has needed no maintenance in over three years.

CYANAMID Plastics and Resins Division

independent of the high shear work.

In Fig. 10, p. 142 viscosity data obtained from resin samples run in both a simple 60 PHR DOP formula and in a reverse roll coating formulation are plotted (1). The trend is definite. Plastisol resins whose simple formula viscosities are high also give high viscosities in the proprietary formula.

Low-shear versus highshear measurements

An illustration of the pitfalls inherent in attempting to predict high-shear properties from low-shear data is shown in Fig. 11, p. 142 (1).

Flow curves for three actual plastisols are plotted. The differences in the flow patterns in the shear rate range measured by the Severs are obvious. Note that the Brookfield viscosities (a low-shear-rate measurement) of these plastisols are all very similar.

Evaluating plastisols with a low-shear-rate viscometer for their behavior in a high-shear application is as difficult as predicting the ability of a plastisol to slush mold properly from high-shear Severs data. A guiding principle in viscosity evaluation work should be to conduct the rheological determination at shear rates duplicating as closely as possible those found in actual operation.

Low-shear versus high-

The Severs rheometer is essentially a high-shear-rate viscometer but it can also be used to make low-shear-rate measurements. Allowing the plastisol to flow under its own weight, collecting the effluxed plastisol, and measuring the time of flow as is done for the regular determination will give viscosity measurements that probably overlap into the shear rate region where the Brookfield operates.

Fig. 12, above, is a graph showing the Severs and corresponding Brookfield values (1) for the same sample. The Severs viscosities are somewhat lower than the corresponding Brookfield value for the simple plastisol recipe used. Such rheological phenomena as yield value and

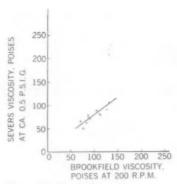


Fig. 12: Low-shear viscosity measurements on Brookfield and Severs rheometers

thixotropy, if present in any substantial quantity, would probably interfere with a good correlation between these two viscometers. This is true because the Severs is continually measuring new and substantially unagitated plastisol. The Brookfield spindle, however, is continually working over the same plastisol, and the values at a constant r.p.m. have been observed to decrease with time due to thixotropic breakdown.

Viscosity and temperature

It is common knowledge that up to the temperature range where the solvating effect of the plasticizer on the plastisol resin becomes significant, the plastisol viscosity will decrease with an increase in temperature. A study of this effect has been made, and a plot of Severs viscosity versus plastisol temperature is shown in Fig. 13, below (1). Both the 100

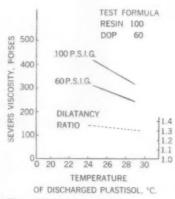


Fig. 13: Severs viscosity versus temperature

and 60 p.s.i.g. viscosities drop increased temperature. However, the ratio of these viscosities drops less rapidly. This ratio may serve as a convenient measure of resin properties where close temperature control is difficult to maintain. (Naugatuck Chemical uses this factor in resin evaluation work. It is referred to as the "dilatancy ratio" and is a measure of the degree of dilatancy in a resin over the shearing range measured; for example, a ratio of 1.0 would result from a plastisol exhibiting Newtonian flow over the shear rate range covered by 60 and 100 p.s.i.g., a ratio greater than 1.0 would indicate dilatancy, and a ratio below 1.0, thixotropy.)

Calculations

The Severs rheometer obeys Poiseuille's law for fluid flow through an orifice (4). The law relates the following factors:

$$V = \frac{PR/2L}{4Q/\pi R^3} = \frac{\text{shear stress}}{\text{shear rate}}$$

where V= viscosity in poises, P= pressure in dynes/cm.² (to convert from p.s.i.g. multiply p.s.i.g. \times 6.895 \times 104), R= orifice radius in cm., L= orifice length in cm., and Q= flow rate from orifice in cc./sec. Since it is generally more convenient to collect the discharged plastisol in a tared container, the flow rate can be expressed in:

$$\frac{g./sec.}{PD (g./cc.)} = cc./sec.$$

where PD = plastisol density.

Since the orifice dimensions are given, calculations are simplified by setting up a constant K_1 :

$$V = \frac{\text{p.s.i.g.}}{\text{g./sec.}} \times K_1$$

where

$$K_1 = \frac{R^4 \times PD \times 6.895 \times 10^4 \times \pi}{8L}$$

The shear rate is dependent on the orifice dimensions.

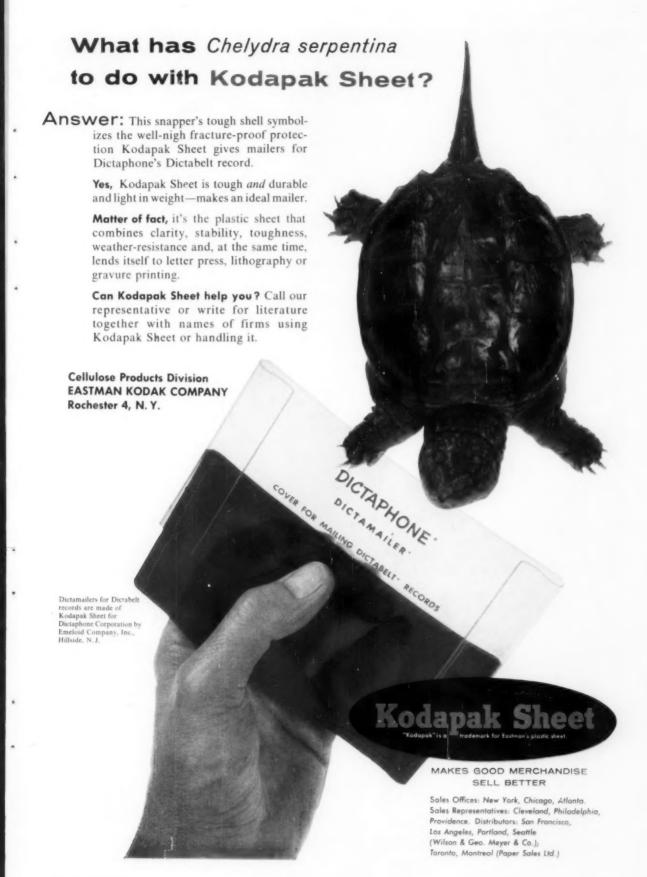
Shear rate
$$= \frac{4Q}{\pi R^3}$$
 or $K_2 \times g./sec.$

where

$$K_2 = 4/\pi R^3 \times \text{density}$$

N. B. Because of the possible oc-

(To page 234)



Environmental stress cracking of

Ethylene plastics

By Kenneth A. Kaufmann*

he phenomenon of environmental stress cracking of ethylene plastics has received considerable attention in recent years. Subcommittee XV on Thermoplastics Materials of A.S.T.M. Committee D-20 on Plastics established a task group in November 1954 within its Section J on Ethylene Plastics to investigate this phenomenon for possible inclusion as a limiting parameter of A.S.T.M. D 1248 Specification for Polyethylene Molding and Extrusion Materials. Much progress towards a test method has been accomplished by this group but two large round robin test programs have demonstrated considerable variation in the results obtained in different laboratories. Within a given laboratory successive test runs generally give good agreement while better correlation between laboratories is obtained when specimens are prepared at one central laboratory than when each laboratory prepares its own. (See Tables I and II, below.) Another cooperative test program is now underway to uncover the factors affecting these large discrepancies be-

tween laboratories and a means of rigidly controlling them. Initial results from this third round robin indicate that extremely close control of molding conditions, sample preparation, and sample bending are very important.

Industry-wide interest in this test is now very high but the difficulties in reproducibility between laboratories is not well appreciated. The task group feels the method may now only be useful as a routine inspection and acceptance test by individual laboratories without expectation of agreement between laboratories. For this reason the method is published as information only, pending the results of further work on a standard method.

Proposed tentative method of test¹

Scope:

1. a) This is a method of test for determining the susceptibility of ethylene plastics to environ-

This method was published for information only in the December 1956 issue of the ASTM Bulletin and is published here with the approval of the American Society of Testing Materials in order to secure wider distribution in the plastics

mental stress cracking when subjected to the conditions herein specified. Under certain conditions of stress and in the presence of environments such as soaps, wetting agents, oils, and detergents, ethylene plastics may exhibit mechanical failure by cracking.

b) The method consists of exposing bent specimens of the plastic having a controlled imperfection on one surface to the action of a surface active agent.

Significance:

Table II: Environmental stress cracking

prepared at individual laboratories'

of polyethylene with samples

2. a) This method may be used for routine inspection purposes by subjecting a required number of specimens to the test conditions for a specified time and noting the number that fail. The cracking obtained with the test reagent is indicative of what may be expected from a wide variety of surface active agents, soaps, and organic substances not absorbed appreciably by the polymer.

b) Stress cracking is a property that is highly dependent on the nature and level of the *Chalrman, Task Group, Section J. Subcommittee XV, A.S.T.M. Committee D-20 on Plastics

Table 1: Environmental stress cracking of polyethylene with samples prepared at central laboratory*

	Tin	ne for 50%	failure——		T	ime for 50%	failure	
Laboratory	Run No. 1	Run No. 2	Average	Laboratory	Run No. 1	Run No. 2	Anonem	
Laboratory	140. 1	140.2	Average	Laboratory	100.1	140.2	Average	
	hr.	hr.	hr.		hr.	hr.	hr.	
A	4.0	2.5	3.3h	G	100	200	150	
В	8.2	6.5	7.4	H	>336	>336	>336	
C	2.0	24.0	13.0	I	12.0	4.0	8.0	
D	8.3	6.0	7.2	J	24.0	27.0	26.0	
E	10.2	16.0	13.0	K	5.8	2.3	4.0	
F	13.0	24.0	18.5b	L	10.0	10.0	10.0	

Date from second round robin. Polyethylene of same batch and manufacture in both tables. Each run consisted of ten samples. Time for stress crack failure to develop in 5 of the 10 specimens was observed.

bKnown deviations in test procedure inadvertently occurred.



Designed with PLEXIGLAS in mind

When PLEXIGLAS® acrylic plastic is used to impart both eye-catching attractiveness and long-term serviceability, a product has a head start to sales success. Here are the reasons more and more manufacturers, designers and molders are turning to PLEXIGLAS to gain a competitive advantage:

- brilliant colors that stay fresh for years
- crystal clarity that gives depth and sparkle to backsurface paints and metallized coatings
- · excellent resistance to impact, weather, discoloration
- optical properties that make possible new designs in edge-lighted moldings
- ability to be molded accurately into complex shapes

Our technical representatives and Design Laboratory staff would like to show you how PLEXIGLAS can solve specific . problems involving molded plastic parts.



Chemicals for Industry

ROHM & HAAS

WASHINGTON SQUARE, PHILADELPHIA 5, PA.

Representatives in principal foreign countries

Conodion Distributor: Crystal Glass & Plastics, Ltd.,
130 Queen's Quay at Jarvis Street, Toronto, Canada.

stresses applied. Under the conditions of the test, high local multiaxial stresses are developed through the introduction of a controlled imperfection. Stress cracking has been found to occur most readily under such conditions. Because of this dependence upon

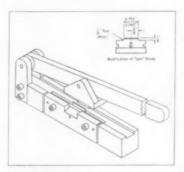


Fig. 1: Nicking jig

level of applied stress this test may only be applicable to ethylene plastics of similar modulus. Comparisons between samples of widely different modulus may not be significant.

c) Where stress concentrations are low, as in thin wall sections, cracking may not occur even in the presence of a cracking agent. Information from this test is not intended for direct application to engineering problems but should be considered primarily as a classification test for ethylene plastics.

Definitions:

3. a) Stress crack—External or internal cracks in a plastic caused by tensile stresses less than that of its short time mechanical strength.

NOTE: The development of such cracks is frequently accelerated by the environment to which the plastic is exposed. The stresses which cause cracking may be present internally or externally or may be a combination of these stresses. The appearance of a network of fine cracks is called crazing.

b) Stress crack failure— For purposes of this test, any crack visible to the unaided eye shall be interpreted as a failure. Extension of the controlled imperfection shall not be construed as a failure. NOTE: Cracks generally develop at the controlled imperfection and run to the outer edge of the specimen approximately at right angles to it. The cracks need not extend completely through the specimen to constitute failure.

Apparatus:

4. a) Blanking die—A suitable rectangular die for cutting specimens 1.5 ± 0.1 in. by 0.50 ± 0.03 inch.

b) Jig—A jig for making a controlled imperfection 0.750 ± 0.005 in. long and 0.020 to 0.025 in. deep, parallel to the long edges of the specimen and centered on one of the broad faces. The jig shown in Fig. 1, left, shall be used.

NOTE: Drawings of this jig may be obtained from A.S.T.M. headquarters, 1916 Race St., Philadelphia 3, Pa.

c) Specimen holders— Lengths of hard brass channel having the dimensions shown in (B) of the Fig. 2, below, shall be used. Any burrs present on the inside of the channel should be removed.

d) Rectangular brass guide bar— $\frac{1}{2}$ - by $\frac{3}{16}$ - by 8-in. bars.

e) Test tubes—Pyrex glass tubes nominally 200 mm. long

to hold test tubes immersed to reagent level.

Reagent:

 a) Igepal CO-630 obtained from General Dyestuff Corp., 435
 Hudson St., New York 14, N.Y.

NOTE: This is an alkyl aryl polyethylene glycol. The reagent should be stored in closed metal or glass containers because it is somewhat hygroscopic.

b) Fresh reagent shall be used for each determination.

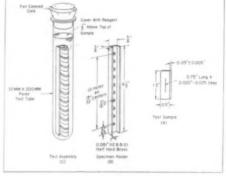
Specimen preparation:

6. a) Specimens shall be diecut from smooth pressed sheet to the dimensions given in Fig. 2 (A) and the die shall be such that clear cuts are made. The sheet may be pressed from granules or pellets, or from plaques of milled material.

NOTE: Where a sample is homogenized by milling, it shall be performed for no longer than 10 min. at the lowest temperature possible for each resin.

b) A molding procedure shall be used that will assure dense uniform sheets with low internal stresses. Sheets may be examined for internal stresses by taking specimens from random locations on the sheet and placing

Fig. 2: Specimen and apparatus used in stresscracking test of ethylene plastics



with an outside diameter of 32 millimeters.

- f) Corks-No. 15.
- g) Aluminum foil—Approximately 0.005 in. thick in which to wrap the corks.
- h) Constant temperature bath—A constant temperature liquid bath maintained at $50.0\pm0.5^{\circ}$ C.
 - i) Test tube rack-A rack

them in a petri dish containing $\frac{1}{8}$ in. of talc and setting the dish in an air oven at 130° C. for 30 minutes. If shrinkage of the specimens is less than 10% in the lengthwise direction, the molded sheet can be deemed satisfactory.

Conditioning:

7. The specimens shall be (To page 232)

For the first time on **ONE** press

automatic compression to transfer molding by turning a knob!

A new hydraulic transfer cylinder has been added to the Baker automatic press! So now with just one Baker press you can switch to either automatic compression or transfer molding in seconds. Yes, here's a versatile combination press that's sure to mean lower piece part prices. Another Baker first! On 100 and 150 ton Baker models. Westinghouse CYPAC controls.

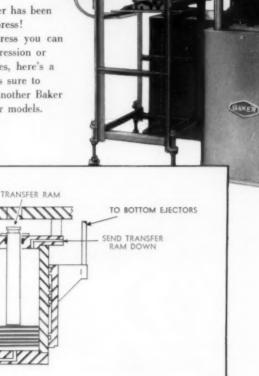
PLATEN

TO BOTTOM EJECTORS

SEND BOTTOM EJECTORS UP

> SEND BOTTOM EJECTORS DOWN

> > SEND TRANSFER





TRANSFER CYLINDER AND BOTTOM EJECTORS

COMPRESSION MOLDING MACHINES

BAKER BROTHERS, INC. 1010 Post Street, Toledo 10, Ohio

Please send your new bulletin on Compression Molding Machines.

NAME

FIRM

ADDRESS

CITY

STATE

Penton — a new chlorine-containing polymer

By E. W. Cronin*

Penton polymer, which chemically is a chlorinated polyether, is now under development. It combines extremely close-tolerance molding characteristics with a high degree of dimensional stability, good chemical resistance, and excellent physical and electrical properties.

new thermoplastic polymer, designated as Penton, may be described as a chlorine-containing polyether. It is still in the pilot plant developmental stage and is available only in experi-

mental quantities. It has the following chemical structure:

There is approximately 45.5% of chlorine in the molecule. With this amount of chlorine, the immediate question that arises is how stable is the product to heat, to light, and to chemical reactivity? It will be noted that the chloromethyl group is attached to a neopentyl carbon atom in the basic polymer skeleton. Because of this, no hydrogen atom is available in the β position for the for-

Presented at the Annual Meeting of the American Society of Mechanical Engineers, November 29, 1956. *Hercules Powder Co.

Table I: Comparative properties of Penton and other plastics

Physical properties	Chlorinated polyether (Penton)	Unplasticized vinyl chloride	Chlorofluoro- carbon	Fluoro- hydrocarbon	Nylon
Tensile strength					
73° F. dry, p.s.i.	6,000	8000-9000	4500-6000	2000	10,900
212° F. dry, p.s.i.	3,500	Too soft to test	800	_	6,000
212° F. wet, yield, p.s.i.	3,000	_	750	-	3,500
Elongation					
73° F. dry, %	35	20-30	25-35	110	90
212° F. dry, %	200-250	Too soft to test	>300	_	>300
Tensile modulus					
73° F. dry, 103, p.s.i.	160	400	190-225	60	430
212° F. dry, 10 ³ , p.s.i.	90	Too soft to test	8		70
212° F. wet, 10°, p.s.i.	30	-	5	-	18
Flexural strength 73" F., p.s.i.	11,000	12,000-15,000	8000	-	14,000
Flexural modulus 73° F.,10° p.s.i.	200	450	180	60	250
Water absorption, %	0.01	0.1	0.00	0.00	1.5
Heat distortion temperature 5 by ½ by ½-in. bar					
264 p.s.i., °F.	185-200	145-185	Not	140	150
66 p.s.i., °F.	300	165	reported	270	360
Izod impact (notched), 73° F.,					
ftlb./in. notch	0.5	0.5-0.8	3.5	2.5-4.5	1.0
Izod impact (unnotched) 73° F.,					
ftlb./in. notched	>33		-		>40
Rockwell hardness, 73° F	R100	R120	R110	D55	R118
Deformation under load,					
122° F., 2000 p.s.i., %	1.4	0.6 - 0.9	×	25	1.4
Compression modulus, 10 ³ p.s.i.	130		175-190	-	480

Mr. Engineer!

AN ADVERTISEMENT ... YES ... BUT WRITTEN BY ENGINEERS FOR

FACTS:

THE KIND YOU CAN SINK YOUR TEETH INTO ...

- Perfect frame-plate window uniformity (the heart of the press) assured by gang-machining four frame plates at one setting. Rough weight 200 tons.
- Sideplate and platen steel receive double heat treatment.
- Unique top bolster mounting, and platen and bolster guide design, eliminate distortion usually caused by thermal changes.
- Laminated asbestos-paper and aluminum foil used for effective insulation.
- Castings produced and all machine work handled in our own plants.
- · Closing speeds and automatic cycling meet any requirement, with number and size of openings to suit.

SEMI- OR FULLY-AUTOMATIC LOADING AND UNLOADING EQUIPMENT SUPPLIED TO MEET CUSTOMERS' PRESENT OR FUTURE PRODUCTS.

RESULTS OF RESEARCH WORK, INVOLVING PHOTO-ELASTIC STRESS ANALYSES AND ACCOMPANYING PHOTOGRAPHS, AVAILABLE TO THOSE INTERESTED.

PRESS AND LOADING EQUIPMENT DESIGNI AND BUILT FOR GENERAL ELECTRIC COMPANY FOR DECORATIVE LAMINATES Platen size 54" x 124" Platen pressure-1500 psi

Fifteen openings Eight 23" rams

Hydraulic line pressure

With loading and personnel elevators Weight of press, without elevators

UNDER SUPERVISION OF ADAMSON UNITED'S COMPETENT ERECTION ENGINEERS, LARGE PRESSES OF THIS TYPE ARE ASSEMBLED IN CUSTOMERS' PLANTS WITH MINIMUM EX-PENSE AND DELAY.

CUSTOMERS ALWAYS WELCOME IN OUR MACHINE SHOPS AND FOUNDRIES. OUR ENGINEERS ARE AVAILABLE FOR CONSULTATION.

Net Results:

DEFLECTION AND THERMAL **TOLERANCE MINIMIZED**

GAUGE UNIFORMITY OF PRODUCT ASSURED

ADAMSON HYDRAULIC PRESSES

MANY SIZES FOR MANY PURPOSES . SPECIAL AND STANDARD DESIGNS RUBBER . PLASTICS . HARDBOARD . LAMINATES

ADAMSON

SALES OFFICES IN PRINCIPAL CITIES SUBSIDIARY OF UNITED ENGINEERING AND FOUNDRY COMPANY

Plants at: PITTSBURGH . VANDERGRIFT . YOUNGSTOWN . CANTON . WILMINGTON (Labdell United Division)

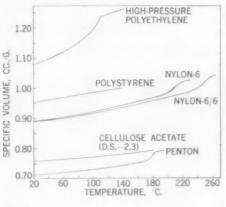


Fig. 1: Volume temperature relationships of various polymers. Data sources—Polyethylene: Grams and Gande, Angew. Chem. 67, 548 (1955); polystyrene: Spencer and Boyer, J. App. Physics 17, 398 (1946); nylon-6 and 6/6: Ecockard, J. Polymer Sci. 6, 601 (1951); cellulose acetate: Mendellseon and Flory, J.A.C.S. 73, 3206 (1951); Penton: Davison, Hercules RI 9357 (1954)

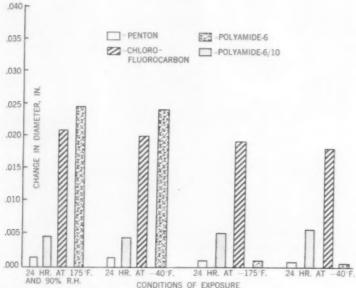


Fig. 2: Dimensional stability of various polymers. Average change in two diameters of 2-in. disks on exposure in sequence

mation of HCl and the product should be stable. Theory in this case is backed up by experience.

Fabrication temperatures of this product can be as high as 550° F. This temperature would break down a vinyl or vinylidene chloride polymer.

Physical properties

The physical properties of Penton are such that no single property stands out over and above that of other plastic materials. However, the combination of properties which it possesses does make it unique and quite outstanding. Of primary importance in any plastic is moldability. What is desired is the ability to mold at economical rates into strain-free, dimensionally close - tolerance, stable forms. The characteristics of the new polymer fit this requirement. There are possible theoretical explanations for this.

The first requirement is a sufficiently low melt viscosity to permit easy filling of the mold. Penton, which is highly crystalline in nature, yields a low melt viscosity.

The second requirement is as low a volume change as possible in proceeding from the melt to the cooled solid. From the set of curves in Fig. 1, above, the low volume change of the new polymer is quite apparent in comparison to other polymers. This property also allows for less mold shrinkage which is an asset in

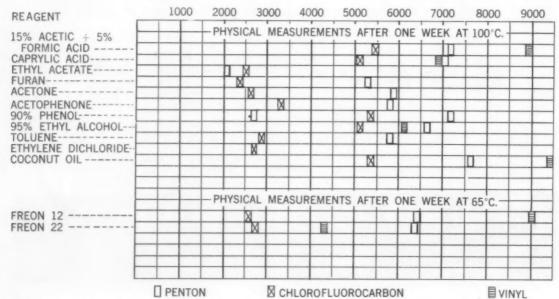


Fig. 3: Chemical resistance of Penton, chloroflurocarbon, and unplasticized vinyls to reagents at left



STABILITY of VINYL WINDOWS



FIDELITY in VINYL RECORDS

are assured when you manufacture with Enjay Oxo Alcohols

Vinyl rear windows in convertibles or vinyl phonograph records . . . and a large number of today's other wonderful, new vinyl products are made from plasticizers using Enjay Oxo Alcohols.

Whatever your product, you can always count on Enjay—the world's largest supplier of Oxo Alcohols—for uniform high quality.

The Enjay Laboratories are at your service to help solve technical problems related to the application or use of any Enjay product.

For detailed information, write or phone today!

Enjay offers a diversified line of petrochemicals for industry:

HIGHER OXO ALCOHOLS (Isooctyl Alcohol, Decyl Alcohol, Tridecyl Alcohol); LOWER ALCOHOLS (Isopropyl Alcohol, Ethyl Alcohol, Secondary Butyl Alcohol); and a varied line of OLEFINS AND DIOLEFINS, AROMATICS, KETONES AND SOLVENTS.



Pioneer in Petrochemicals

ENJAY COMPANY, INC., 15 WEST 51st St., NEW YORK 19, N.Y. Other Offices: Akron, Boston, Chicago, Los Angeles, Tulsa

Table II: Comparative chemical resistance of Penton, chlorofluorocarbon, and rigid vinyl (Physical measurements after 3-mo. exposure at room temperature)

Reagent	Chlorinated polyether (Penton)		Chlorofluoro		Rigid vinyl	
	Weight change	Tensile strength	Weight change	Tensile strength	Weight change	Tensile strength
Control (not exposed)	%	p.s.i. 6000	%	p.s.i. 5000	%	p.s.i. 9500
Ethyl acetate	3.6	5800	3.7	2000	135	Failed
Furan	6.5	4900	6.1	1700	40	Failed
Acetone	5.2	4600	0.3	4700	127	Failed
Toluene	1.5	6300	0.8	4200	47	Failed
Heptane	0.1	6100	0.1	-	0	9600
Ethylene dichloride	6.0	5800	0.1	5000	Dissolved	Fragmented
Ethyl ether	6.3	6000	5.6	1400	11.6	2800
10% NH OH	0.1	6100	0.04	_	0.5	8700
37% HCi	0.14	5700	0.0	_	0.2	8900
10% aniline	0.03	6100	0.01	4900	0.05	9700
Distilled water	0.1	6100	0.2	_	0.03	9400

Table III: Electrical properties of Penton

	-Room-t	emperature	measur	rements	Measured at 100° C.
Property	Original	1 week, 25° C. water	1 week, 100° C. water	1 week, 100° C. oven	2 hr., 100° C. oven
Volume resistivity,		-			
ohm-cm.	5×1013	3×1015	6×1015	****	-
Dielectric constant					
60 cycles	3.1	_		_	_
10 ^s cycles	3.1	-		-	
10° cycles	2.8	-	-	_	-
$50 \times 10^{\circ}$ cycles	2.9	2.9	3.1	2.9	3.5
Dissipation factor					
60 cycles	0.016	_	(0.000)	-	-
10 ³ cycles	0.008	_	_	_	warm.
10° cycles	0.01	_	and a	_	-
50×10^{6} cycles	0.015	0.015	0.023	0.016	0.034
Dielectric strength					
v./mil	400				
v./2-mil film	4000				



Fig. 4: Sanders-type valve made of Penton

handling close-tolerance requirements.

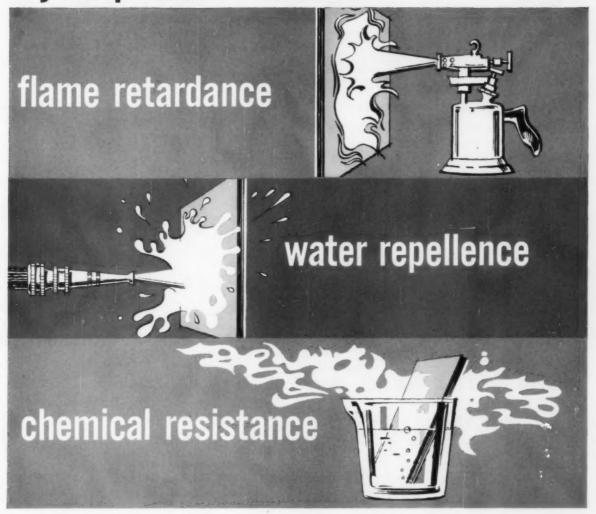
The third requirement is the ability to take up the volume change, even though small, as the compound cools without introducing strains in the molded piece. With a crystalline polymer like Penton that has a sufficiently slow rate of crystallization, the mold can be filled with amorphous material. As the temperature drops, the product stays in the amorphous condition long enough to allow the volume change on cooling to be taken up by relaxations in the comparatively soft amorphous regions. The plastic then

crystallizes to a hard, strain-free molding. Our results, both theoretical and practical, indicate that with a mold temperature of 190 to 200° F. it is substantially impossible to process parts containing strain patterns.

Figure 2, p. 152, records changes that occurred when 2-in. disks of Penton, two types of polyamides, and a chlorofluorocarbon were exposed in sequence to the conditions noted. It can be clearly seen that only Penton, of all these thermoplastics, remained relatively stable through a full cycle of exposures representing typical end-use conditions of these finished products.

The individual physical properties of Penton, as pointed out previously, are not startling in their comparison with other plastic materials (Table I, p. 150). There are a few properties, however, that should be stressed for they are important to the potential uses visualized for this product. Note the water absorption (0.01%). This is within the accuracy of the test and can be described as substantially nil. With this degree of absorption, however, the dimensions of the molded piece are not altered in passing from dry to humid atmospheres as occurs with other materials such as the polyamides and the cellulosics. Another property of real significance is the tensile strength at 212° F. or in boiling water. This coupled with its very low cold-flow char-

If your product needs...



investigate CHLOROWAX

DIAMOND ALKALI'S versatile chlorinated paraffin, Chlorowax, has been used with outstanding success in paints, plastics, inks, rubber and many other compounds. In addition to improving product characteristics, it often speeds processing and reduces cost.

Chlorowax is highly resistant to oxidizing agents, acids and alkalies; does not condense or polymerize. In

liquid grade it serves as a plasticizer to provide good flexibility. In resinous forms it provides high chlorine content for maximum fire retardance. Chlorowax is insoluble in water; compatible with many diverse types of synthetic and natural organic materials.

For information on Chlorowax, write Diamond Alkali Company, 300 Union Commerce Bldg., Cleveland 14, O.

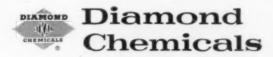




Fig. 5: Valve made of Penton is in perfect condition after flashback of hot HCl in a chlorination reaction pipe line.

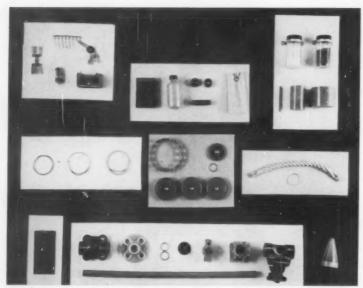


Fig. 6: Some applications of Penton



Fig. 7: Wedge-shaped actuator bars, tapering in thickness from 0.0032 in., provide good example of Penton's ability to be molded in thin-wall sections. Highly crystalline in nature, this new plastics material is characterized by a low melt viscosity, a property that facilitates injection molding operations

acteristic opens up many potential industrial applications.

On the market today are a number of so-called chemicalresistant plastics. They fall into two classifications. 1) Those of the fluorocarbon type which are probably the most resistant to chemical attack of all chemical polymers; they are, however, either quite expensive or difficult to fabricate. 2) Substantially below these compounds in degree of chemical resistance are such materials as the vinyl chlorides, the vinylidene chlorides, and the modified styrenes. All of these compounds are limited by their heat-resistant properties along with their poor resistance to certain organic solvents. Table II, p. 154, and Fig. 3, p. 152, contain relative data on polymers gener-

ally considered for chemical resistance problems. Penton fills this gap both economically and in its properties. One extremely important property of the product is its resistance to hydrolysis in slightly acidic or alkaline environments. Long-term test data, examples of which will be given later, have now been obtained. It appears that this new polymer will have a real place in water meters, in valves and parts of refrigeration equipment, in motors operating under adverse conditions, and in various valves for the chemical industry.

Electrical properties

Most polymers available today can be classified by their dielectric loss characteristics. Such polymers as the polyethylenes, styrenes, and fluorinated hydrocarbons are very-low-loss materials, and suitable for general veryhigh-frequency use. Between these and the high-loss materials, such as the phenolics, polyamides, and cellulosics, is a large gap that today is filled with the chlorofluorocarbons. Penton also fits into this application. In Table III, p. 154, the change in power factor and dielectric constant is shown with frequency. Also shown is the change in these characteristics as well as the change in volume resistivity when the material is exposed to adverse conditions. A comparison of these electrical characteristics with those of other commercially available polymers will show the marked stability of the product under these conditions.

Of importance to the design of electrical equipment is the surface resistance before and after exposure to water. Using A.S.T.M. method D 257-54T it was observed that this property for Penton changes from 5×10^{15} ohms to 3×10^{15} ohms after 1-yr. exposure to tap water.

Applications

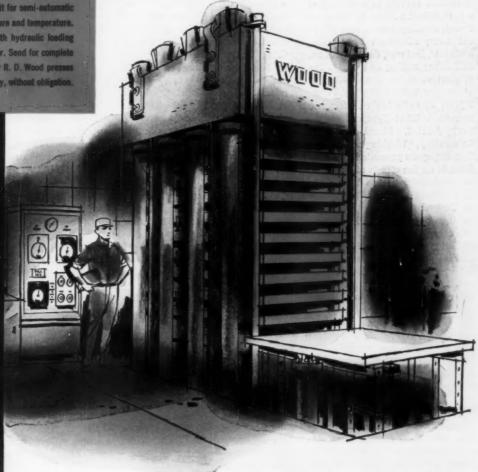
The use of this new polymer in valves has been mentioned. A Hills-McCanna valve (Saunderstype valve, Fig. 4, p. 154) shows, we believe, a case history without parallel in the plastics industry. The unsupported valve has been (To page 231)

2000-ton R. D. Wood Hydraulic Press for laminating and polishing plastics. Press has 10—4" openings, platen size 42"x83", and is of the completely self-contained type, including pumping unit for semi-automatic control of time, pressure and temperature. Press is equipped with hydraulic loading and unloading elevator. Send for complete details of this or other R. D. Wood presses for the plastics industry, without obligation.

The most productive plants use R. D. Wood presses

For proof, look at production records—and downtime for maintenance. Then watch an R. D. Wood press at work.

See for yourself the smooth, precise operation—
the dependable performance—even under tough conditions. Finally, inspect an R. D. Wood press
up close. Notice the soundness of design, the excellence of materials, the scrupulous care given to each detail of construction. These are the reasons why R. D. Wood presses have been the standard of excellence for more than 150 years.





R. D. WOOD COMPANY

PUBLIC LEDGER BUILDING . PHILADELPHIA 5, PENNSYLVANIA Representatives in Principal Cities















MAKERS OF HYDRAULIC PRESSES AND VALVES . FIRE HYDRANTS . CAST-IRON PIPE . GATE VALVES . GAS PRODUCERS . ACCUMULATOR

Plastics Digest

Abstracts from the world's literature of interest to those who make or use plastics or plastics products. For complete articles, send requests direct to publishers. List of addresses is at the end of Plastics Digest.

General

Technical service in the plastics industry. Plastics (London) 21, 183-85 (Aug. 1956). The nature and scope of technical service in the plastics industry is reviewed. Technical service is sub-divided as: technical service to the customer; development of new product uses; education by leaflets, abstracts, lectures, demonstration, and films; testing and evaluation of plastics.

Effects of radiation on dielectric materials. ONR Symposium Report ACR-2. Naval Research Laboratory, Washington, D. C. The 21 papers presented at a conference on the effects of radiation on dielectric materials at the U. S. Naval Research Laboratory in December 1954 are contained in this publication. The papers are concerned with the effects of radiation in polymer syntheses and on polymers, electrical insulating materials, alkali salts, diamond, glass, refractory materials, and dielectric materials. Basic conceptions of radiation chemistry, energy dependence, effects on crystals, and analytical evaluation techniques are also discussed. Available from U.S. Department of Commerce, Office of Technical Services, Washington 25, D. C.

Materials

Plastisol coatings. Canadian Plastics 1956, 27-29 (May). The coating of fabrics with vinyl chloride plastisols is described. The plastisol, a mixture of plasticizer and vinyl chloride resin, is applied to the fabric to be coated and then heated to fuse the resin into the cloth and produce a continuous coating. Control of coating thickness and heating is of critical im-

portance. Stabilizers, usually in the form of organo-tin compounds or metallic soaps of cadmium, barium, etc., are required in the formulation to prevent degradation of the vinyl resin during heating. Plastisol coatings can be applied also to metal, wood, paper, in fact almost anything resistant to temperatures up to 400° F. A large variety of embossing patterns can be applied to plastisol-coated fabrics, including crocodile skin, leather, elephant skin, bamboo, and many other designs. Best results are obtainable only by tailoring the plastisol formulation to the desired application.

Cellulose propionate molding compounds. D. A. Jones. SPE J. 12, 36-38 (Aug. 1956). The properties of cellulose propionate molding compounds are reported.

Plasticizers for P.V.C. I. Types in current use. I. Phillips and P. G. Youde. Brit. Plastics 29, 337-42 (Sept. 1956). A brief discussion is given of the numerous plasticizers used with polyvinyl chloride, grouped under their chemical classes. These include the phthalic esters, phosphoric esters, sebacic esters, adipic esters, and other types. The effects of varying amounts of plasticizers and of different types of plasticizers on numerous properties of polyvinyl chloride are presented in numerous tables and graphs. II. Future developments. E. Chadwick. Ibid. 29, 342-43 (Sept. 1956). New developments in plasticizers for polyvinyl chloride are reviewed. These include the availability of phthalic esters of Oxo-alcohols, development of epoxide plasticizers, attempts to produce suitable oleates and phenyl esters of alkyl-sulfonic esters, and advances in the field of polymeric plasticizers.

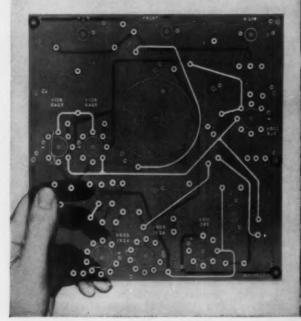
Flame- and heat-resistant epoxu resins. P. Robitschek and S. J. Nelson. Ind. Eng. Chem. 48, 1951-55 (Oct. 1956). The Diels-Alder adduct of maleic anhydride with hexachlorocyclopentadiene is an effective hardener for epoxy resins. The rate of hardening is rapid and the cured resins are characterized by unusually high thermal yield points as well as fire resistance. This adduct, used as a hardener wiith a liquid epoxy resin such as Araldite 6020 or Epon 828, gives optimum thermal yield points when present in amounts of approximately 54% by weight. The thermal yield points increased within the range of 50 to 57% of the adduct anhydride by weight, with increasing cure temperatures and cure time. Curing at 180° C. produced castings that had A.S.T.M. D 648-45T heat distortion temperatures in the vicinity of 200° C. and glass cloth laminates that retained about 80% of the flexural strength and stiffness at 177° C.

Plasticizer problems in vinyl resin studies. L. H. Wartman and W. J. Frissell. Plastics Tech. 2, 583-88, 590 (Sept. 1956). Information on compatibility and weight loss of a number of plasticizers for vinyl chloride plastics is reported. Mechanisms involved are discussed.

Molding and Fabricating

Mains frequency electrical induction heating for the plastics industry. W. E. Lorton and M. A. Craske. Plastics (London) 21, 172-73 (July); 204-06 (Aug. 1956). Induction heating equipment operating on mains frequency (40-60 cycles/sec.) at mains voltage and with a closed magnetic circuit is discussed. General principles are presented as well as considerations in application of this type of heating in compression molding, production of laminates, and transfer molding. By using induction heating in injection molding machines, the plasticizing capacity is increased and a greater throughput of conSalew . . . No problem with electrical properties when your printed circuits are based on XXXP laminates made with RCI PLYOPHENS 5027 and 5036.

Photos courtssy of The Formica Company





Left . . . You reduce stack losses when you use PLYOPHEN 328 for binding fibrous glass or mineral weel into insulation batts. And P-328's low alkelinity definitely improves the water resistance of the insulation.

fast cures and sure results...

when you use RCI liquid phenolic resins...job-designed for your laminating and bonding needs.

Reichhold has a PLYOPHEN liquid phenolic tailored to your exact need... whether the resin is going into the manufacture of printed circuits, into a binder for fibrous glass or mineral wool insulation, into filler sheets for decorative laminates, or any one of scores of other products.

PLYOPHENS are job-designed to assure fast production and uniform results. RCI controls quality all the way . . . right from the beginning, by producing its own phenol and formaldehyde.

Write us the details of your phenolic resin application and ask for a *sample* of the RCI liquid phenolic that will do the job best. Then try it out and see if you don't get superior results.

Creative Chemistry ... RGI Your Partner in Progress

REICHHOLD

Synthetic Resins • Chemical Colors • Industrial Adhesives • Plasticizers
Phenol • Formaldehyde • Glycerine • Phthalic Anhydride

Maleic Anhydride • Sodium Sulfite • Pentaerythritol • Pentachlorophenol

REICHHOLD CHEMICALS, INC., RCI BUILDING, WHITE PLAINS, N. Y.

sistently plasticized material can be obtained without any risk to the continuous operation of the machine or the quality of the product. Similarly in extrusion, the use of induction reduces variations in the level and distribution of the heat, thus reducing variations in the condition of the material and the quality of the product.

Progress in the spark machining of dies. Brit. Plastics 29, 332-36 (Sept. 1956). The principle upon which the electro-erosion process of metal removal is based is discussed and some of the most recent equipment is described. In the spark process, a very high temperature is produced on the surface of the work and this has the effect of removing small particles from the material. It is possible to produce complex die shapes in a variety of steels without the need for post-heat treatment and consequent loss of close tolerance dimensions. With some equipment, up to four heads can be operated from one control unit and the machines can operate automatically.

Control of chemical and physical factors in the applications of casting resins. P. L. Nichols. SPE J. 12, 26-31, 34-38 (Nov. 1956). The characteristics of polymers that influence casting are discussed in terms of pot life and shrinkage. The problem of heat transfer is considered and a number of calculations are presented illustrating the complexities of the problem. A general discussion of the mechanical behavior of casting resins is given and the effects of fillers on these properties is considered.

Experiences with twin-screw extruders and their application in the construction of a new extruder. K. Tanner. Kunststoffe 46, 429-38 (Sept. 1956). After a thorough investigation of the conditions present during extrusion of thermoplastic materials in the twin-screw extruder a new machine was developed. It was found that when the viscosity was adjusted by decreasing the temperature in the vicinity of the melting zone, the granules often present

in the finished product were completely dissolved which made it possible to use the new extruder for practically all thermoplastics without the need for exchanging the screw or any of the other machine parts.

Applications

Small oil-free bearings. H. S. White. J. Research Nat. Bur. Standards 57, 185-204 (Oct. 1956). An investigation was made of materials that may be suitable for use as oil-free bearings in aircraft clocks and similar instruments between -55 and 70° C., to replace lubricated jewels that do not give satisfactory operation at subzero temperatures because of congealing of the oil. Another advantage of an oil-free instrument is the freedom from cleaning and oiling periodically during shelf storage. Materials included in the investigation were plastics, plastics with fillers, impregnated metals, and impregnated carbon. Friction tests were made with an inclined-plane type of static-friction apparatus, and with shafts rotating in loaded journal bearings, at temperatures from -55 to 70° C. With bearings of typical materials stored on steel shafts, the effect of shelf storage on static friction was investigated. Wear tests were made with loaded bearings on 1/4-in.diameter rotating shafts made of different types of steel. With oscillating 1/4-in.-diameter shafts and 1000-g. loads, wear data were obtained on bearings of the more promising materials, which included Teflon and Kel-F compositions. Using an endstone wear testing machine, wear data were obtained for end-thrust bearings made of typical bearing materials. The performance of oil-free bearings in 18 timepieces was investigated.

Effect of additions of high melting FT waxes to polyethylene in the manufacture of containers. G. Benthin. Modern Packaging 30, 171-72, 260, 262 (Oct. 1956). The addition of a high melting synthetic mineral wax to polyethylene offers a series of measurable advantages. Bottles manufactured from such combinations have a harder, more agreeable "hand,"

are less easily compressible, and have a more opaque appearance than those manufactured from polyethylene alone. In addition, the permeability of polyethylene to water vapor, alcohol, hydrogen, and carbon dioxide is reduced by the addition of this wax.

Hard-wearing monofilaments replace traditional materials. Brit. Plastics 29, 316-21 (Sept. 1956). The properties and applications of five classes of plastics monofilaments are discussed. They are nylon, polystyrene, and polyvinyl chloride, which are used mainly in the brush industry, and polyethylene and polyvinylidene chloride which are used mainly in woven form.

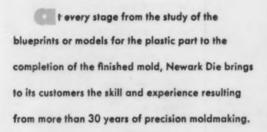
Properties

Effect of crystallinity on the properties of nylons. H. W. Starkweather, Jr., G. E. Moore, J. E. Hansen, T. M. Roder, and R. E. Brooks. J. Polymer Sci. 21, 189-204 (Aug. 1956). Increasing the degree of crystallization of unoriented 6/6 or 6/10 nylon increases the stiffness, yield point, tensile strength, and hardness, but reduces the impact strength, particularly in the high crystallinity range. The impact strength was increased by increasing the molecular weight, but the other properties were substantially unchanged. The effect of varying water content was independent of the effect of varying crystallinity and generally acts in the opposite direction.

Transient electric currents from plastic insulators. R. J. Munick. J. Applied Phys. 27, 1114-18 (Oct. 1956). Change of voltage across a solid insulator produces a transient electric current. Measurements of such currents from the polymers of methyl methacrylate. monochlorotrifluoroethylene, ethylene, styrene, and tetrafluoroethylene were made for times from 10 to 104 sec. after change in voltage at 25° C., 47° C., and several points below room temperature. The current produced by applying a constant voltage to an undisturbed specimen decays as the negative nth power of the time, where n is a constant between 0.7 and 1.1. The currents

all combine to turn out molds

that meet the most exacting requirements of the molders and users of plastic parts



Old skills—new machines—turn out the molds that have kept the same molders coming back to Newark Die, year after year. The type of mold, too, that keeps molders' customers coming back to them year after year.

Write for articles on Solving Big Mold Problems and New Revolutionary Type Injection Molding Machines.



SPECIALISTS IN MOLD ENGINEERING



THE HANDS OF SKILLED CRAFTSMEN



THE MOST MODERN EQUIPMENT



AND RIGID INSPECTION

NEWARK DIE COMPANY

22 SCOTT STREET, NEWARK 2, N. J.

Phone: MArket 2-3305



MIN CHEMISTRY at work



Big, strong, dense, translucent reinforced plastic part at high filler loading

This is a fiberglas fertilizer hopper for farm field rigs. It's about 17" in height and diameter. Goodyear Aircraft Corp. mass-produces it by the preform-liquid mold method.

MINERAL FILLER REPORT: ASP 400 is the M & C filler used in this hopper. Goodyear says ASP 400's performance in all five critical "areas" is unmatched by any other filler:

- a. Smooth, dense, strong part-to end trouble from acids, weather, breakage.
- b. Translucency to see contents at a glance-due to ASP 400's excellent wet-out and suspension.
- c. No reaction on resin-no catalytic effects . . . long pot life.
- d. High filler loading-no viscosity problems.
- o. Molding ease, proper flow and thixotropy-giving fast die fill-out and closing for high production, low reject.

Our business is to supply low-cost non-metallic mineral products that are process-engineered to make things go smooth in your plant . . . good in your markets. If you'd like more information, use the coupon.

MINERALS & CHEMICALS CORPORATION OF AMERICA 1455 Essex Turnpike, Menlo Park, N. J.

I'm interested in a natural mineral product for_

Send: Detailed plastics literature Free samples



CORPORATION OF AMERICA

1455 Essex Turnpike, Menio Park, N.J. Leaders in creative use of non-metallic minerals ATTAPULGITE (Attapulgus) ACTIVATED BAUXITE (Porocel) KAOLIN (Edgar . ASPs) LIMESTONE (Chemstone) SPEEDI-DRI FLOOR ABSORBENTS

SERVICE AND STOCKS IN 30 CITIES

from polyethylene and polytetrafluoroethylene do not conform to the superposition principle, in contradistinction to what is usually reported for solid insulators. The currents at 100 sec. exhibit maxima at -32° C. for polymethyl methacrylate and at -50° C. for polymonochlorotrifluoroethylene. It is suggested that permanent electric dipoles play an important role in the currents from polymethyl methacrylate and polymonochlorotrifluoroethylene.

Testing

Identification of synthetic fibers by micro fusion methods. D. G. Grabar and R. Haessly. Analytical Chem. 28, 1586-89 (Oct. 1956). A scheme for the identification of synthetic fibers by the use of micro fusion methods is based upon the melting point of the fiber, the eutectic temperature of the fiber with p-nitrophenol as a reference compound, and the characteristic behavior observed during the heating and cooling of the fibers. Observations are made using a hot stage on a polarizing microscope. Reproducible melting points are obtained by using a silicone oil as a mounting liquid for the fibers to exclude air from the fibers while heating and to improve the microscopic image. Tabulated micro fusion data are given for thirteen synthetic fibers.

Publishers' addresses

Analytical Chemistry: American Chemical Society, 1155 Sixteenth St., N. W. Washington 6, D. C.

British Plastics: Iliffe and Sons, Ltd., Dorset House, Stamford St., London S. E. 1, England.

Canadian Plastics: Monetary Times Printing Co., Ltd., 341 Church St., To-ronto 2, Ontario, Canada. Industrial and Engineering Chemistry:

American Chemical Society, 1155 Sixteenth St., N. W. Washington 6, D. C.

Journal of Applied Physics: American Institute of Physics, 57 E. 55th St., New York 22, N. Y.

Journal of Polymer Science: Inter-science Publishers, Inc., 250 Fifth Ave., New York 1, N. Y.

Journal of Research of the National Bureau of Standards: Superintendent of Documents, Government Printing Office. Washington 25, D. C.

Kunststoffe: Karl Hanser Verlag, Leon-hard-Eck-Strasse 7, Munich 27, Germany. Modern Packaging: Modern Packaging Corp., 575 Madison Ave., New York 22, N. Y.

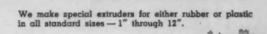
Plastics (London): Temple Press Ltd.. Bowling Greene Lane, London E. C. 1. England.

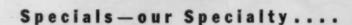
Plastics Technology: Bill Brothers Publishing Corp., 386 Fourth Ave., New York 16, N. Y.

SPE Journal: Society of Plastics Engineers, Inc., 513 Security Bank Bldg., Athens, Ohio.



for Rubber or Plastics





The National Erie line of extruders, now made by Aetna-Standard, a foremost builder of machinery, has been in existence since 1902. The NE line features custom-built extruders, not off-the-shelf models. When you need special extruders designed for your individual need, that's our specialty...
Engineered Extruders.

Send your inquiry to Aetna-Standard's sales associates — Hale and Kullgren, Inc., 613 E. Tallmadge

Ave., Akron 10, Ohio.

Designer of Extruders Since 1902

> We make and supply all types of servicing equipment for special extrusion processes, such as Reelers, Water Coolers, Capstans, etc.

Sales and Engineering by

THE AETNA-STANDARD ENGINEERING CO., PITTSBURGH, PA.

PLANTS IN WARREN, OHIO - ELLWOOD CITY

U.S. Plastics Patents

Copies of these patents are available from the U.S. Patent Office, Washington, D. C., at 25¢ each

Molding. G. W. Kelly (to Columbus Plastics). U. S. 2,764,781, Oct. 2. Plasticizer for injection molding machines.

Fibrous products. A. D. Jordan, Jr. (to Rohm and Haas). U. S. 2,-765,228-9, Oct. 2. Resin-impregnated fibrous products.

Films. W. J. Wayne (to Du Pont). U. S. 2,765,241, Oct. 2. Polytetrafluoroethylene film.

Laminate. L. E. Williams (to Du Pont). U. S. 2,765,250-1, Oct. 2. Laminates of polymeric terephthalate esters.

Resin beads. A. I. Goldberg and R. F. Doering (to National Starch). U. S. 2,765,286, Oct. 2. Polymer resin beads.

Resins. B. F. Aycock (to Rohm and Haas). U. S. 2,765,287, Oct. 2. Urea-formaldehyde condensates.

Stabilization. F. Groff and R. K. Dearing (to Carbide and Carbon). U. S. 2,765,292, Oct. 2. Stabilizing rubber-modified polystyrenes.

Polyethylene. W. B. Happoldt (to Du Pont). U. S. 2,765,293, Oct. 2. Polyethylene modified with ethylene distearamide.

Polyamides. D. C. England (to Du Pont). U. S. 2,765,294, Oct. 2. Polyamides containing tertiary aminoethyl groups.

Terpolymers. W. W. Crouch and J. F. Howe (to Phillips Petroleum). U. S. 2,765,295, Oct. 2. Butene-1-acrylonitrile-sulfur dioxide polymers.

Polymers. F. Strain (to Columbia-Southern). U. S. 2,765,296, Oct. 2. Polymers of butadiene dimer epoxides.

Polymerization. R. G. Heiligmann and P. B. Stickney (to Borden). U. S. 2,765,297, Oct. 2. Ethylene polymerization.

Bonding. H. Vieten. U. S. 2,765,386, Oct. 2. High frequency heating attachment for sewing machines for heat-bond thermoplastics.

Extruding. R. D. Gambrill (to

Western Electric). U. S. 2,765,441, Oct. 2. Apparatus for monitoring and extruding plastic materials.

Extrusion. V. Zona (to Pirelli). U. S. 2,765,490, Oct. 9. Preheating and plastifying plastic material.

Extrusion. W. A. Magerkurth (to National Rubber). U. S. 2,765,491, Oct. 9. Extrusion apparatus.

Extrusion. W. E. Velvel (to Du Pont). U. S. 2,765,492, Oct. 9. Extrusion apparatus.

Embossing. T. W. Winstead (to Hedwin). U. S. 2,765,493, Oct. 9. Forming and embossing thermoplastics.

Fibrous glass material. R. E. Schwartz, J. G. Bush, and L. J. Freitick (to Vibradamp). U. S. 2,766,163, Oct. 9. Compressible shock absorption material.

Polymerization. W. N. Stoops and B. Thompson (to Carbide and Carbon). U. S. 2,766,215, Oct. 9. Polymerizing chlorotrifluoroethylene.

Resins. M. T. Harvey and P. L. Rosamilia (to Harvel). U. S. 2,766,-218, Oct. 9. Reacting acetone-formal-dehyde condensate with aniline.

Plastics. F. G. Lum, E. F. Carlston, and J. C. Butler (to California Research). U. S. 2,766,221-2, Oct. 9. Polymers of m-xylylene diamine and adipic or isophthalic acid.

Heat sealing. T. W. Winstead (to Hedwin). U. S. 2,766,364, Oct. 9. Heat sealing device.

Extruding. G. E. Henning (to Western Electric). U. S. 2,766,479-80-81, Oct. 16. Extruding cellular plastics.

Molding. J. C. Stokes. U. S. 2,766,-483, Oct. 16. Heating cylinder for injection molding.

Pipe joining. F. X. Costanzo (to Victaulic). U. S. 2,766,518, Oct. 16. Joining plastic pipe.

Heat sealing. S. F. Parham (to Emhart). U. S. 2,766,809, Oct. 16. Heat sealing apparatus.

Polyethylene. S. A. LouKomsky (to Plax). U. S. 2,767,103, Oct. 16.

Treating polyethylene to improve adhesion to it.

Surface treatment. D. M. Young and P. D. Berry (to Carbide and Carbon). U. S. 2,767,107, Oct. 16. Antistatic treatment of hydrophobic resin articles.

Molding compound. M. T. Harvey (to Harvel). U. S. 2,767,150, Oct. 16. Molding compound of cashew nut shell oil polymer.

Copolymers, L. H. Dunlap and R. H. Reiff (to Armstrong Corp). U. S. 2,767,151, Oct. 16. Copolymers of aryl olefins and unsaturated oil esters.

Resins. E. A. Sutton (to Monsanto). U. S. 2,767,153, Oct. 16. Interpolymer latices of unsaturated esters and acrylonitrile.

Resins. J. E. Masters (to Devoe and Raynolds). U. S. 2,767,157, Oct. 16. Manufacture of epoxide resins.

Resins. F. Schlenker and H. Starck (to Chemische Werke Albert). U. S. 2,767,158, Oct. 16. Epoxide resins cured by alcoholates of polyvalent metals.

Coating. R. L. Millar (to Glidden). U. S. 2,768,149, Oct. 23. Alkyd-modified siloxane coating.

Resin. R. L. Millar, C. G. Moore, and N. G. Peterson (to Glidden). U. S. 2,768,150, Oct. 23. Silane-epoxide resin.

Polymers. R. M. Schulken, Jr. and H. Long (to Eastman Kodak). U. S. 2,768,151, Oct. 23. Methacrylonitrile polymers heat stabilized with organic halogen compounds.

Resins. A. Gancberg. U. S. 2,768,-152, Oct. 23. Organopolysiloxane resins.

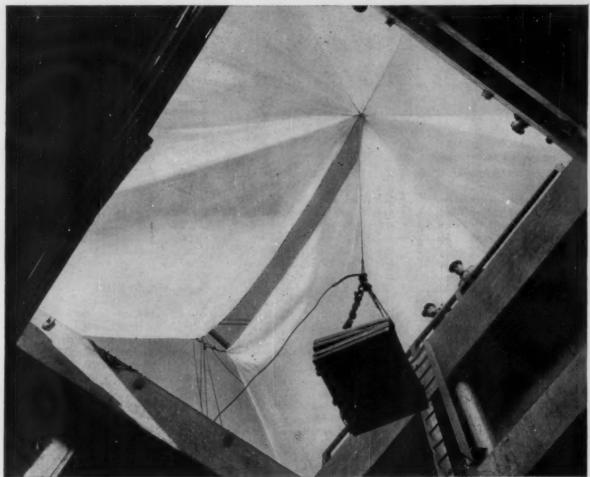
Curing. E. C. Shokal (to Shell). U. S. 2,768,153, Oct. 23. Curing polyepoxides.

Resin. C. C. Unruh and A. C. Smith, Jr. (to Eastman Kodak). U. S. 2,768,-154, Oct. 23. Urethane-modified materials.

Foam. H. Lindemann (to Lonza). U. S. 2,768,407, Oct. 30. Closed cell cellular plastics.

Molding. R. F. Strigle, Jr. and W. Smith, Jr. (to M. A. Knight). U. S. 2,768,408, Oct. 30. Molding furan resins.

Ion exchange. H. Schnell, W. Becker, and O. Bayer (to Farbenfabriken Bayer). U. S. 2,768,991, Oct. 30. Cation exchangers from copolymerized carboxylic acid and a cross-linking agent.



Hatch Tent of Fortisan-36 rayon in use on Moore McCormack freighter "Mormacswan."

Look what we've hatched with Fortisan-36

This new Moore McCormack hatch-tent is another impressive example of the remarkable things you can do with Fortisan-36 rayon.

Here Herculite has laminated Fortisan-36 scrim into a fabric far lighter than the standard duck tent. It shields open hatches during cargo loading in bad weather. It goes up, comes down quickly—saving longshoreman time, shippers' money. It is so clear that light illuminates the hold. It need not be hung till dry after use, stores in small areas, has long life. This hatch

tent is a product of Herculite Protective Fabrics, Belleville, N. J.

We invite you to see what high-strength, lightweight, no-stretch Fortisan-36 can do for you. Celanese Corporation of America, Textile Division, Industrial Sales Dept., Box 1414, Charlotte, N. C.

Branch Offices: 180 Madison Ave., New York 16; 22 W. Madison St., Chicago 2.

For Export: Amcel Co., Inc. & Pan Amcel Co., Inc., 180 Madison Ave., New York 16.



FORTISAN® RAYON . FORTISAN®-36 RAYON . ARNEL® TRIACETATE . ACETATE . VISCOSE-RAYON



Spring-loaded thermocouples

The Type J thermocouple was designed specifically for measuring sub-surface temperatures (as at bottoms of holes drilled into injection cylinders, extruder barrels, die blocks, etc.). An Inconel-X spring holds the couple tip firmly against the surface whose temperature is to be measured. Available in straight and 90° bend types, the couple can be obtained with a bayonet adapter that permits quick removal and re-insertion. Minneapolis-Honeywell Regulator Co., Industrial Div., 2753 Fourth Ave. S., Minneapolis 8, Minn.

Impulse heat sealers

A new line of thermal-impulse heat sealers, the Pacemakers, are designed for the packaging industry. The four models can make straight seals of 9, 13, 25 and 45 Specifications and claims made and appearing in these pages are those of the manufacturers of the machinery and equipment described and are not guaranteed by Modern Plastics.

in. in length, with respective output wattages of 300, 450, 600, and 750. These are the continuous-duty ratings. Electric timers control the length of the heating impulse and the dwell time for cooling. Films up to 15 mils thick can be sealed with this equipment, which can be ordered for either hand operation or operation by foot-pedal. Packaging Industries Limited, Inc., 151 Pine St., Montclair, N. J.

Three-station forming machine

Heating can be performed simultaneously with forming, unloading, and loading on the Rotary-Vac three station vacuum forming machine. All operations are automatic and can be set on two timers located on the overhead control panel. At the loading station the operator must have both hands on two safety switches before the clamp frame will close. After the clamp has locked, the

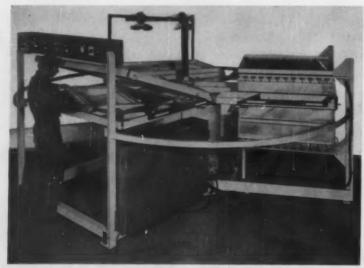
circuit is closed and the operator is free for secondary operations. At the heating station the oven is completely enclosed. Two banks of Thermatron heaters sandwich the plastic sheet. The upper and lower banks of heaters are each controlled from independent percentage input timers. Either bank may be cut out when working with extremely light-gage materials. At the forming station, vacuum molds are attached to the molding platen which has a 17 in. stroke. Two vacuum ports make possible the handling of two molds during the same forming cycle. An accessory to the molding station is an upper platen which facilitates the use of male helpers, pressure, and mechanical forming operations. Vacuum or air pressure may be used with the upper platen when additional force is required. An electrical interlock is provided for molds with power-actuated parts. The pictured Rotary-Vac is 141/2 ft. in diameter and has a 40 by 60 in. molding area. Comet Industries, 9865 Franklin Ave., Franklin Park. Ill.

Lab-size forming machine

Portable laboratory vacuum forming machine Model A-14 has a forming area of 14 by 14 in. and can drape draw up to 6 inches. The unit runs on 110-v. lines and can be operated from a standard wall outlet. According to the manufacturer, producers of plastic sheet material can use the machine for displays, control work, testing, and demonstrating. The machine includes a 2.5 cu. ft./min. pump and a 4-gal. surge tank. Atlas Vacuum Corp., 367 Orchard St., Rochester, N. Y.

Large injection machine

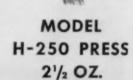
Model 6000-A Hydro Block injection press incorporates a patented mold closing system said to be completely new in the injection molding field. Closing pressure is 2.136 tons. Two approach pistons hydraulically control four locking nuts on the posts; a main piston, used for rapid closing of the molds, has a stroke of only 20 mm., requiring a water supply under negligible pressure provided by a hydraulic



Comet industries Rotary-Vac permits heating, forming, and loading and unloading operations to proceed simultaneously

Van Dorn





is FAST!

Up to 1200 cycles per hour (dry run)



AUTOMATIC!

One operator can run 3 or more presses, for greater flexibility, and lower labor costs. Selective control permits semi-automatic operation.

EASILY OPERATED!

by semi-skilled help. With simple, handy controls, job can be set up in 20 minutes.



The sketches list only a few of the many thermoplastics molded on Van Dorns.



Containers over 720 per hour

Nylon Coil Forms — over 2000 per hour



at Low Cost on VAN DORNS

Vinyl Cord Sets —over 2000 per

Polyethylene Closures — over 9000 per hour

Remember, For the Price of One Large Press, You Can Own a BATTERY of VAN DORNS!



SEMI-AUTOMATIC PRESS



POWER OPERATED, LEVER CONTROLLED PRESSES 2-oz. and 1-oz. models,

WRITE FOR complete data on model H-250 and other

equipment shown.
FINANCING
AVAILABLE



PLASTIC GRINDER Grinds up rejects,



MOLD BASES Available from stock

THE VAN DORN IRON WORKS CO., 2685 EAST 79th ST. . CLEVELAND 4, OHIO



F.I.M.S.A.I. 250-oz. injection molding machine incorporates a new, patented mold closing system

pump with three horizontal pistons, delivering 100 liters/min. When the injection cycle is completed, the high pressure on the main piston is removed and the four locking nuts are unlocked by the two approach pistons.

The machine includes a preplasticator consisting of a screw revolving in a cylinder heated externally by a series of electrical resistances and controlled by a variable-speed electrical motor. A charging chamber links the preplasticator and the injection cavity; material is forced into the cavity by a 500-mm. stroke plunger piston under 238 tons pressure.

Effective capacity of this machine is 250 oz. per shot on a 60-sec. cycle; pressure on the material is about 14,225 p.s.i. Maximum thickness of molds 25 in., minimum thickness 12½ in.; maximum distance between platens 78 in.; plasticating capacity almost 400 lb./hr. F.I.M.S.A.I., Milan, Italy, Export Dept., Scacchi & Cie., 45 Rue D'Atros, Paris VIII, France.

Electronic heat sealers

The Dynatherm line of heavyduty electronic heat sealers includes four models with output powers of 2.5, 4.0, 6.0, and 10 kw. Lines voltages for all four is 220, with an option of 440 on the largest. These machines all feature extremely rugged construction so that rated output can be obtained on continuous duty. Each has an arc anticipator that prevents costly damage due to arcing, double hand controls that require both hands to be out of danger during processing, and easy accessibility to all working parts. Bed plate sizes of the four

models are 16 by 30 in., 20 by 30, 20 by 30, and 20 by 30. Daylight openings are 7 or 8 in., while the press forces, at 100 p.s.i. line pressure, are 490 lb., 960, 960, and 1590 pounds. Dynatherm Div. of Guild Electronics, Inc., 388 Broadway, New York 13, N. Y.

Take-up equipment

A dual reel take-up that can switch from full to empty reel without stopping cable movement has been added to a line of wire machinery. Two models are available, each designed for reel diameters up to 50 in. and reel widths up to 36 inches. Model DR-50-15 runs cable sheaves with 18-in. O.D. by 15 in. bottom diameter at up to 50 lb. tension. Model DR 50-21 has sheaves of 24-in. O.D. by 21-in. bottom diameter. Speed of raising and lowering reels is adjustable and controlled by an air valve which handles 2-ton reels with 80 p.s.i. air pressure. Separate traverse guides are provided for each reel and traverse reversal is instantaneous. A cable accumulator horizontally located above the machine is pneumatically operated. It requires no weights and provides 66 ft. of wire accumulation while changing wire from one reel to the other. Davis-Standard, Mystic, Conn.

Compression press

Automold Model A50-B compression molding press works on reduced air line pressure to produce 50 tons on 100 p.s.i.; increasing the pressure to 120 p.s.i. will produce 60 tons. This model has a three-roller toggle system for increased stability and extra performance. The manufacturer

states that there has been no sacrifice of speed in the molding cycle. Automatic Molding Machine Co., 3217 Exposition Pl., Los Angeles 18, Calif.

Web control

Designed for use in printing, coating, tubing and re-rolling, slitting and punching, tentering, intersheeting, and manifolding, the Linear Edgetrol photoelectric edge guidance system controls edge registration and web position of opaque materials, porous materials (lace, gauze, netting, non-woven fabrics), single thickness film (polyethylene, vinyl, cellophane), and laminates. Edgetrol systems, said to maintain control accuracies within 1/82 in. at any speed, are available in three integrated forms for use with present web control equipment as well as in new applications where edge control has previously



Intercontinental Dynamics' edge guiding system

been impossible. Seven sensing heads are provided to cover any material. Intercontinental Dynamics Corp., 170 Coolidge Ave., Englewood, N.J.

Production analyzer

The Time Recorder + Totalizer is an instrument that records graphically on a moving tape on- and off-time of production equipment and also continuously computes and registers total operations time. Installed on injection and compression molding presses, vacuum forming machines, extruders and other equipment, the recorder-totalizer monitors operations continuously,

HINGES...

press-fit assembly

(Holds like

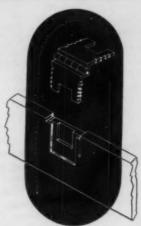
a drive-screw)

with

or without

double action

"C" Springs



GEISSEL Mig. Co., Inc.

109 LONG AVENUE HILLSIDE, N. J., U. S. A.



WILLIAMS-WHITE PLASTIC MOLDING PRESSES Built to your specifications



Custom built to your specifications, these presses represent the peak of up-to-date design and master craftsmanship. They are the result of WILLIAMS-WHITE & CO's. 102 years of machinery building experience. This experience and our staff of engineers and designers are available to you without obligation.

REPRESENTATIVES

ALLIED NORTHWEST MACH. TOOL CORP., Portland, Ore.
A. L. BECHTEL & SON, Cleveland, Ohio
GEORGE A. DAVIES MACH'Y. CO., Los Angeles, Calif.
SEIFREAT-ELSTAD MACH'Y. CO., Cincinnati, Columbus
or Dayton, Ohio

EDWARD A. LYNCH MACH'Y. CO.,
Wynnewood, Philadelphia, Pa.
PAGEL MACH'Y. CO., Milwaukee, Wis.
PERINE MACH'Y. & SUPPLY CO., Seattle, Wash.
FRANK RYMAN'S SONS, Filitsburgh, Pa.
WILLIAMS-WHITE & CO., 53 W. Jackson Blvd., Chicage
E. E. WOOD MACH'Y. CO., Detroit, Mich.

Builders of Machinery Since 1854



WILLIAMS-WHITE & CO

300 EIGHTH ST., MOLINE, ILLINOIS
PRESSES • BULLDOZERS • BENDERS • PUNCHES • SHEARS

FEBRUARY 1957

est representative or direct to WILLIAMS-WHITE & CO.

Don't risk web damage!

FUSE AND CURE COATINGS with the DAWSON VAPO-FUSER®



Unit shown here is raised. This prevents injury to material when the web is stopped.

The Dawson Vapo-Fuser delivers an evenly-distributed flow of low-pressure heated steam or air over the entire width of the coated film. The temperature of the hot vapor can be maintained accurately at any point from 300° F. up to 900° F. Heat transfer efficiency is very high, and the entire coating is completely fused without damage to the web material.

Because of its unique patented method of delivering hot vapors, the Vapo-Fuser requires only one-third to one-quarter the space of some other types of equipment. For complete safety, the Vapo-Fuser is equipped throughout with explosion-proof fittings.

Write for our catalog that gives full additional information.

F. C. DAWSON ENGINEERING CO. / Canton, Massachusetts

451 U.S. manufacturers
pay no income tax at all
in <u>Puerto Rico</u>
LEARN WHY

Commonwealth of Puerto R Economic Development Add 579 Fifth Ave., New York 17	ministration
	cturer" with information about my particular
Name	Title
Company	
Address	
Product	

permits ready analysis of new methods, tools, etc., aids in preventive maintenance, and permits management to detect inefficient operations. Standard Instrument Corp., Div. of Heat-Timer Corp., 657 Broadway, New York 12, N. Y.

Machine mounting pads

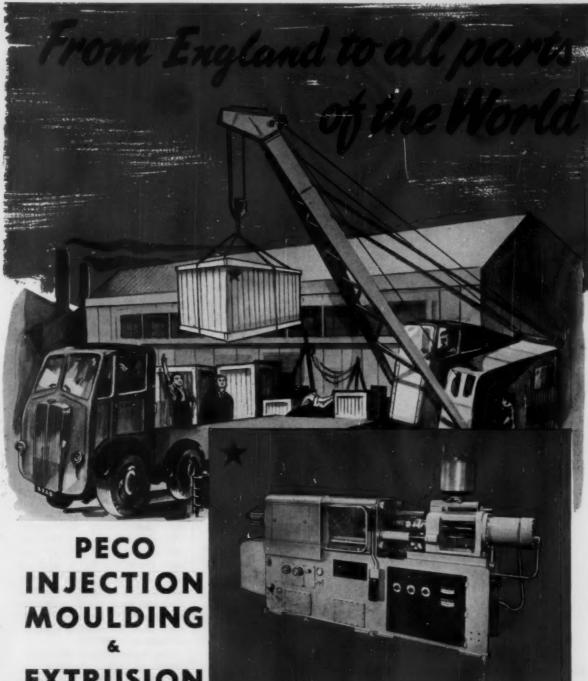
Air-Loc mounting pads, which will withstand 43 p.s.i., can, if enough of them are used, sustain the load of very large machines, while keeping them in a definite position. They have been successfully applied, for example, in mounting an 87,000-lb. injection molding machine, and they eliminated the usual lagging or bolting of the machine to the floor. Fourteen pieces, each 8 by 18 in., spaced on 47-in. centers, were used. Since there is no solid connection between the supported machine and the floor, noise and transmitted vibration are greatly reduced. Clark-Cutler-McDermott Co., Franklin, Mass.

Dielectric tester

Designed for use by laboratories engaged in the development of high-temperature resins and laminates for microwave propagation, a new test instrument provides direct readings of permittivity and loss tangent for small samples at fixed spot frequencies. Three models are available to cover the frequency range of 6000 to 17,000 mc.; provision is made for dielectric measurements at up to 450° C. The equipment can be used by chemists having little knowledge of microwave techniques. Microcell Ltd., 56 Kingsway, London W. C. 2, England.

Automated feed of glassreinforced resins

A feeding attachment for compression molding presses makes it possible to mold glass-reinforced polyester rope automatically. The Stokes rope feeder was developed especially for the Stokes Model 741 press and can be adapted to other automatic presses. This attachment can feed up to 24 cavities arranged in almost any desired pattern. Each tube of the feeder feeds a particular cavity in the mold. As the



EXTRUSION MACHINES

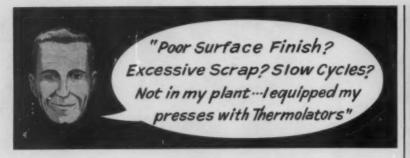


PECO Machines are used by manufacturers of plastics articles of the most varied kinds, both at home and in all the five continents. Unceasing research and experiment have placed them in the forefront of technical development, and their fine construction is the outcome of long engineering experience and skill.

PECO Injection Moulding Machines are made in a range from 2 oz. to 160 oz. capacity.

PECO MACHINERY SALES (WESTMINSTER) LTD. 28 VICTORIA STREET . LONDON . S.W.1 . ENGLAND

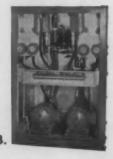
Tel.: ABBey 1793/4/5 Grams: PROFECTUS, SOWEST, LONDON Cables: PECOMATIC, London Works: THE PROJECTILE & ENGINEERING CO. LTD., ACRE STREET, LONDON, S.W.8, ENGLAND



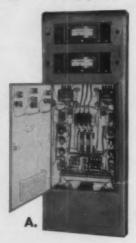
I hese three major profit stealers—bad finish, slow cycles and excessive scrap-are reduced to a minimum when Thermolator Mold Temperature Controls provide constant, even cavity temperatures. Pesky problems such as sink marks, strains, and prominent welds are also lessened by Thermolators.

Thermolators depend on bigb velocity circulation of water to keep mold surfaces within 1/2° of a preselected temperature, up to 250° F. This finest mold temperature control system is widely used all over the world. Many leading molders are 100% Thermolator equipped for every press.

Having a Thermolator on your injection press means you set the best mold temperature . . . then forget it!



Thermolator Model H for permanent press installation. (a) Control Cabinet, (b) Operating Unit. Portable models, too.



Find out how Thermolator Controls can increase your molding profits

Molders will find a detailed explanation of Thermolator operation and other helpful data (including information on mold design for temperature control) in this valuable booklet. Write for your copy.



Plastic Molders Engineering Co., 55 E. Washington Street, Chicago, Illi-nois, FOR CANADA: Richardson Agencies, Ltd., 18 Holly St., Toronto 12, FOR EUROPE: Merac, Inc., 44 Rue La Boetie, Paris (6E) France



Stokes unit for feeding reinforced plastics rope

feeder indexes, a prescribed length of rope is cut off, dropped through an opening in the feed plate into the appropriate tube. The feeder can be adjusted to take various diameters of rope and to cut various lengths of pieces. F. J. Stokes Corp., 5500 Tabor Rd., Philadelphia 20, Pa.

Air slip forming

In the "airslip" method of drape forming, hot air is introduced between the mold and the sheet during the mechanical preforming operation. The pressure of the air is so adjusted that the sheet does not balloon but simply "floats" over the mold. The result is that the hot sheet slips over the edges and corners of the mold on a cushion of hot air, and distributes itself naturally over the mold contours to give uniform wall thickness. At the same time, the sheet is biaxially stretched.

The Formvac Model G-1, in addition to being designed for standard vacuum and drape forming, also incorporates provision for airslip drape forming. Effective molding area is 24 by 36 in.; maximum depth of draw when drape or airslip forming varies between 10 and 12 in., depending on type and size of sheet. Instrumentation for fully automatic forming cycle is also included, although the machine can be manually operated for experimental purposes or for setting up cycles. Hydro-Chemie Ltd., Dreikoenigstrasse 21, Zurich, Switz.



GEORGIA ST. - INDIANAPOLIS 4, IND.



A. Schulman, Inc. answers today's biggest plastic question . . .









Why are so many molding and extruding plants buying

processed vinyl and polyethylene?

Because they're saving money. Our processed vinyl and polyethylene DO cost less, but at the same time, precise laboratory control assures a product of the highest quality. Working with modern methods and machines, we are able to fill your raw material orders to EXACT specifications, at definite savings to you. HOW?

We maintain complete laboratory equipment of the very latest type, and a staff of

highly skilled technicians checks the quality of vinyl and polyethylene we buy, then keeps a constant watch on our processing. Whether you do molding or extruding, we are in a position to handle your requirements . . . just let us know what product you make and give us your specifications.

There is NO GUESSWORK involved - and it COSTS YOU LESS.

Samples mailed on request.

If you make products like these you can depend on A. Schulman, Inc. laboratory controlled polyethylene and vinyl. A TRIAL ORDER WILL CONVINCE

AKRON, OHIO 790 E. Tallmadge HEmlock 4-4124

NEW YORK CITY 460 Park Ave. 738 Statler Bldg. MUrray Hill 8-4774 Liberty 2-2717

14th & Converse BRidge 1-5326

A. SCHULMAN, INC., LTD. Ibex House, Minories LONDON E.C. 3, ENGLAND A. SCHULMAN (U.S.A.) Ombit Bödekerstrasse No. 22 HANOVER, GERMANY Telephone: 2-6212



Books & Booklets

Write for these publications to the companies listed. Unless otherwise specified, they will be sent gratis to executives who request them on business stationery.

"Lange's Handbook of Chemistry"

Edited by N. A. Lange and G. M. Forker

Published in 1956 by Handbook Publishers, Inc., Sandusky, Ohio. 1969 pages. Price: \$8.50.

The ninth edition of this famous handbook contains about two dozen features not found in previous editions; examples: abundance of elements or isotopes in the cosmos, in the human body, and in the earth; properties of carbon and low-alloy steels; polarography, luminescence, activity coefficients, photo exposure indices, viscosity comparison chart. Many of the tables, including the important ones on corrosion and heat-resistant alloys, critical constants, organic analytical reagents, and vapor pressures, have been completely rewritten for this edition. Numerical values in the tables of properties of chemicals, which constitute over a third of the book, have been brought up to date. Strong in the chemical tables, the book is a bit weak in the mathematical section: one wonders if chemists need a 300year calendar as often as they do tables of integrals, of trigonometric and hyperbolic functions, factorials, powers of numbers higher than 3, and statistical tables. The book is semi-flexibly bound in durable Fabricoid. For chemists, a great buy at the price.

"An Encyclopedia of the Iron & Steel Industry"

Compiled by A. K. Osborne
Published in 1956 by Philosophical
Library, Inc., 15 E. 40th St.,
New York 16, N. Y.
558 pages. Price: \$25.00.

The main purposes of this Encyclopedia are to provide a concise description of the materials, plant, tools, and processes used in the iron and steel industry and

in those industries closely allied with it, from their preparation of the ore down to the finished product; and to define the technical terms employed. The book is intended as a work of reference and should prove of most value to those smaller firms in the iron, steel and engineering industries that have not attained sufficient size to warrant maintaining a library of their own.

Kaolin handbook. The first four bulletins, part of a continuing series that will eventually cover subjects ranging from production to final end-product use, have been issued in a loose-leaf folder. The titles of the bulletins are: "A Visit to Georgia Kaolin Company"; "Progress Through Georgia Kaolin Research"; "Ajax Kaolins: New Scientifically Formulated Ceramic Materials"; and "Hydrite Kaolinites in Reinforced Plastics." 75 pages. Georgia Kaolin Co., 433 N. Broad St., Elizabeth 3, N.J.

Comparator chart. A basic materials comparator chart of Phenolite laminated plastic—phenolic, melamine, polyester, epoxy, and silicone—lists their electrical, mechanical, physical, chemical, fabrication, and general properties and rates them excellent, good, fair, or poor for various functions. 4 pages. National Vulcanized Fibre Co., Wilmington 99, Del.

"The Versatile Vinyl Fabrics" contains decorating suggestions for vinyl fabrics, cleaning and stain removal information, and do-it-yourself hints. Included are sewing and pasting tips and step-by-step procedure for recovering shabby chair seats. Leading furniture and interior designers are represented by photographs

showing home furnishings applications of vinyl materials and their reasons for choosing them. 28 pages. Vinyl Fabrics Institute, 65 E, 55th St., New York 22, N. Y.

1,5-Pentanediol. Bulletin F-40006 gives information on the properties, chemical reactivity, and applications of 1,5-pentanediol, as well as shipping data. Literature references are included. Carbide and Carbon Chemicals Co., 30 E. 42nd St., New York 17, N. Y.

Welding. All methods of metal joinery common to the welding shop, plus cutting without oxygen, are detailed in this handy manual. 52 pages. All-State Welding Alloys Co., Inc., 249-55 Ferris Ave., White Plains, N. Y.

Pneumatic controllers. The new Series 500W pneumatic controller is described and illustrated in bulletin A130. Sections dealing with control principles and illustrating the various control modes available are included. 56 pages. The Bristol Co., Waterbury 20, Conn.

"Tall Oil in Industry." Bulletin No. 17 discusses tall oil potentials to 1957; whole tall oil production, consumption, and usage; and refined and distilled tall oil production, consumption, and uses. 5 pages. Tall Oil Div., The Pulp Chemicals Association, 122 E. 42nd St., New York 17, N. Y.

Unplasticized polyvinyl chloride. Catalog gives complete data on the Van-Cor line of unplasticized polyvinyl chloride pipe, fittings, and valves-covering the chemically-resistant, normal-impact Van-Cor 1, and the chemically resistant, high-impact Van-Cor 2. Contents include physical properties; chemical resistance tables; pipe, fittings, and valve dimensions; and flow rate charts. Useful pipe assembly and installation data are also given. 16 pages. The Colonial Plastics Mfg. Co., 2685 E. 79th St., Cleveland 4, Ohio.

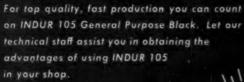
Plasticizers. Bulletin lists properties and specifications of 15 plasticizers, including methoxyethyl, butoxyethyl, butyl and

FAST CURING . . . GENERAL PURPOSE

INDUR 105 BLACK

PHENOLIC MOLDING COMPOUND

A woodflour-filled, two-step compound with excellent electrical properties, superior surface finish, and universal molding qualities.



For samples and specification data on the complete line please write.





PROPERTIES*

Flow Range	Soft to Hard
Granulation	16 Mesh
Bulk Factor	2.3-2.7
Mold Shrinkage	0.005-0.007 in./in
Molded Specific Gravity	1.35-1.37
44	

Heat Distortion	
Temperature °F.	290 min.
Water Absorption	0.5% max.
Tensile Strength	6,500 psi min.
Flexural Strength	9,000 psi min.
Compressive Strength	30,000 psi min.
Impact Strength, Izod.	0.30 ft. lbs./in.
	of notch, min.

Dielectric Strength,		
Short Time		
Dielectric Strength,		
Step by Step		

Dielectric Constant	
@ 1,000 cycles	7.0 max
Power Factor	

^{*}Approximate values based on standard ASTM test methods wherever possible.

@ 1,000 cycles



PITT-CONSOL CHEMICAL COMPANY

191 DOREMUS AVE., NEWARK 5, N. J.

A SUBSIDIARY OF PITTSBURGH CONSOLIDATION COAL COMPANY

FEBRUARY 1957

175



PLANDEX DOES NOT OWN A SINGLE OUNCE OF SCRAP

Every job gets personalized attention, therough quality and quantity control, and time-saving, money-saving reprocessing at Plandex. Our modern, streamlined reworking service profets your scrap, improves your profits. May we prove it to you? There is no obligation on your part.



octyl esters, phthalates, adipates, stearates, oleates, and laurates. Performance data with polyvinyl chloride are presented along with recommendations for use with cellulosics, polystyrene, and synthetic rubber. Included are charts and graphs on solubility, resin compatability, and viscosity-temperature relationships. 48 pages. Technical Service Laboratory, Kessler Chemical Co., Inc., State Rd. and Cottman Ave., Philadelphia 35, Pa.

Tefion. Bulletin A-3, "Tefion Production Aids for all Types of Mechanical Equipment," gives a detailed description of the uses, specifications, applications, and properties of such typical products as "self-stick" Tefion tape, cementable and plain Tefion sheets, plain and cementable Tefion coated fibrous glass, Tefion rods, tubes, cements, etc. 4 pages. Chicago Gasket Co., 1271 W. North Ave., Chicago 22, Ill.

Viscometers. Catalog gives information on the various models and accessories available, discussing accuracy, speed, reliability, portability, range, and flow properties. Specifications and illustrations are included. 8 pages. Brookfield Engineering Laboratories, Inc., Stoughton 9, Mass.

Irradiated polyethylene. Illustrated Technical Report CDD-I-2 "Irrathene" discusses moisture and chemical resistance, encapsulation ability, and thermal stability of this insulating material. Also described are performance characteristics, typical applications, and techniques of use. 12 pages. Chemical Development Dept., General Electric Co., One Plastics Ave., Pittsfield, Mass.

Adhesives. Technical bulletin sheets listing the function, composition, properties, consistency, usage, and application of the following adhesives are available: Bulletin No. 03-165-0-10-56, Thixon PA-B, for vulcanization bonding of polyacrylate stocks to primed metals; Bulletin No. 03-33-0-9-56, Thixon NM-2, for vulcanization bonding of neoprene stocks to metal; Bulletin No. 03-(To page 180)

MARKED IMPROVEMENTS IN IDENTIFICATION AND DECORATION

Variety in the shirt business ... Proving again that there's no single marking method best for every need, a customer of ours uses both labeling and direct marking, and each method is doing a good job. For shirt boxes, he has changed from paper labels to direct imprinting with our 105-10 machines, helping both looks and economy. For washing instructions, style name, etc. on about

five million sports shirts a year, however, he has replaced preprinted or woven labels bought from an outside source with labels printed on our 126C automatic machine. Saves him about \$2.00 per thousand labels, and inventory problems

and obsolete labels are things of the past. Goes to show what the right method can do, and how we may be able to help you find it.

A 4000-year-old idea . . . is behind all screen process printing done today, and a brand new Markem machine is no exception. What's different about our idea, however, is the fact that screen printing's peculiar advantages (heavy coverage with fine detail on almost any surface) are now "mechanized" for volume production.

The 90S, as we call it, is so new that only a few are "in the field", but we've heard many enthusiastic comments. Those of you who make such things as cosmetic containers,

printed circuits, play shoes, instrument

dials, plastic bowls, etc. may find the

90S worth looking into.

The familiar "45"... Our "45" machines will probably never enjoy quite the same fame as Mr. Colt's, but they are going great guns. Five years ago this spring we built the first one, and just now serial no. 1100 has been shipped. Nine different models presently comprise the 45 series, and their field stretches from boxes, bags and die cut labels to resistors, condensers and lollipop sticks to ignition parts and plastic novelties. Markem "45's" can't mark everything (we make about 40 other basic types of machines). but then

types of machines), but they do illustrate the many jobs a well-designed standard machine can do.

Markom has devoted 46 years to developing morking machines, elements and compounds—and the best ways to use them. If experience like this can help you, call Markom Machine Co., Keene 20, New Hampshire.



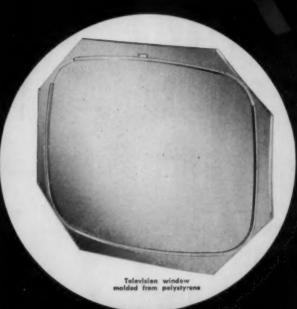
give your products the benefit of the

Precision Molding



The Makray "OK" on your product is the result of a unique system of engineering, designing, molding and assembly room techniques that result in the best in plastics technology. But, while we are unique in the quality of painstaking craftsmanship and inspection that we apply to your products, we are completely competitive in price. Whether we originate the design or work from yours our objective is the same: To give you a plastic product that looks better, works better and sells better.

When you are in or near Chicago come out and visit us. You'll see why results are finer from America's finest injection molding plant. Or, call or write today for the complete story on the Makray "OK"



America's finest, most modern'
plastic molding plant



24-hour operation assures speedy delivery

26 latest Hi-speed presses . . . 8 oz. to 60 oz. capacity

Precision molds designed and built in our own shop

Complete engineering service to serve you . . . save you money

MAKRAY MANUFACTURING COMPANY

Precision Plastic Molders

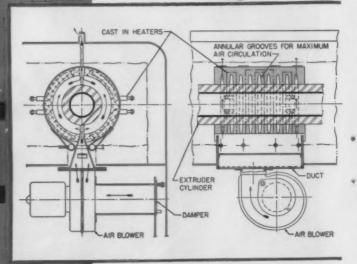
4400 North Harlem Ave., Chicago 31, Ill. • GLadstone 6-7100

Closer ance

PLASTIC EXTRUSIONS

with

NRM



Balanced
HEAT CONTROL"*...

THE MOST PRACTICAL, ECONOMICAL AND PRECISE WAY TO CONTROL HEAT IN EXTRUDER CYLINDERS

NRM Electrically Heated Thermoplastics Extruders with "Balanced Heat Control" were the first machines to give the plastics industry truly accurate control over frictional heat. By balancing operating heat with the temperature of the extruder, Balanced Heat Control virtually eliminated "pulsation" at the die and greatly increased dimensional accuracy of the extrusions.

Today, NRM's Balanced Heat Control is still the most effective and efficient method of controlling frictional heat, and because of refinements made over the years, it is now even more efficient than ever. Here are a few reasons why:

It's EFFECTIVE... because it is located between the two opposing sources of excess heat, namely the heat of the compound, and the heat inertia of the heating elements after the current has been cut off by the controls. It's accurate, it's simple, it gives complete, positive heat control.

It's SELF-CONTAINED — The system consists of a series of deep slots cut into half-circle aluminum castings which enclose the full length

of the cylinder, thus forming inverted fin-shaped channels through which high volumes of air are passed at low pressure. The slots do not interfere with conduction of necessary working heat, yet provide a maximum area for the radiation of excess heat. Balanced Heat Control is also used to cool the Extruder rapidly for shut-down. The entire Balanced Heat Control mechanism is contained in the Extruder, with the push-button controls being in the Control Cabinet. With no expensive nor complicated connections to compressed air, steam, oil or water systems, it is the most compact extruder heat control mechanism in use today.

It's ECONOMICAL — NRM's Balanced Heat Control costs little to operate. Its only power requirement is electricity for blower motors, of which there is only one to each heating zone. Its economy, together with the better quality and more accurate extrusions it makes possible, are just more of the many PLUS reasons why NRM Extruders with exclusive Balanced Heat Control assure a higher ratio of profit from thermoplastics extrusion.



2541-1

* NRM PATENTED FEATURE

"Tear-rific Idea!"



Just pull the tab – Dictaphone
Dictabelt Records are unpacked,
ready for use. No strain, no knives,
no damage, no extra handling.
Need a better box?
Better see H & D.



162-0-10-56, Thixon Primer PA-P, used in conjunction with Thixon PA-B secondary cement for vulcanization bonding of polyacrylate stocks to metal; and Bulletin No. 12-60-2-10-56, Piccolyte Resins, for increased tackiness and adhesion, for use in making up resin emulsions, as the softening agent in pale rubber compounds, and as a waterproofing agent in concrete. Harwick Standard Chemical Co., 60 S. Seiberling St., Akron 5, Ohio.

Abrasive selection guide. Bulletin No. 333 gives the characteristics, applications, and selection of a full range of blast cleaning abrasives. The illustrated manual details methods for improving cleaning quality and cutting production costs in foundry, descaling, mold and die, shop maintenance, decorating and carving, part reclamation, and finishing operations. 12 pages. Pangborn Corp., Hagerstown, Md.

Fibre, fishpaper washer prices. Ordering information and tolerances of vulcanized fibre and fishpaper washers from 1/4- to 1/8-in. thick, and from 1/4- to 3-in. OD with any ID is given in a new price list. 3 pages. Penn Fibre & Specialty Co., Inc., 2024-2030 E. Westmoreland St., Philadelphia 34, Pa.

Solvent stripper. Technical Bulletin No. 600 discusses Monastrip EP solvent stripper for dissolving epoxy and polyester potting, casting, and encapsulating compounds. The bulletin sheet also gives price and delivery charges. Solvent Div., Mona Industries, Inc., Paterson 17, N. J.

Repairs for structural moldings. Leaflet describes and illustrates eight steps in a repair technique for structural moldings made from polyester resin reinforced with fibrous glass. 4 pages. British Industrial Plastics Ltd., Tat Bank House, Oldbury, Birmingham, England.

Silicone rubbers. Technical Report L/T325, "The Dielectric Properties of Silicone Rubbers," by E. Rushton and G. Russell, presents a summary of the team's



CUT DOWN SHUT DOWN! Hydraulic pressure on printing nips* permits operator to simultaneously back away all nips. Engraving rollers keep turning even while the printing machine is stopped. Ink doesn't dry on rollers. No wash-up needed.

Printers of all unsupported and supported plastic film prefer fast, quiet Lembo Rotogravure Presses for perfect, strain-free, in-register printing at speeds to 125 yards per minute. Shown above, 4-color — 52" between printing nips. Also, 6-color - 60" between nips. Write or call to see Lembo Rotogravure Presses in operation.

LEMBO

MACHINE WORKS, INC. 248 East 17th St., Paterson 4, N. J. Lambert 5-5555



BALL

OR UNLIMITED APPLICATIONS



We specialize in the manufacture of precision balls in desired diameters made from non-metallic materials including.

ACETATE BUTYRATE POLYSTYRENE NYLON TEFLON LUCITE EPOXY STYROFOAM WOOD CORK FIBER Remember, only a ball does the job of

So consider a ball for your purpose— and consider the job well done by ORANGE PRODUCTS.

applications.

Small turnings of cylindrical Range of sizes is from 1/4" to 1" shapes formed from round diameter and up to 7" long. We rods and tubes for all types of hold tolerances of .002 on plastic and .005 on wood, plus or minus.



554 MITCHELL ST., ORANGE, NEW JERSEY

Consult Headquarters!

H. KOHNSTAMM & CO., INC.

Prime Manufacturer of

DRY COLORANTS

For More Than 100 Years



ATLAS COLORS

Our active association with technical groups of the basic producers of molding compounds and membership in the S.P.E. and S.P.I. keeps us abreast with the constant changes in and additions to the compounds being molded and colored by the molder.

This, plus the fact that we have been a prime manufacturer of dry colorants for over a century, puts us in the unique position of being recognized as a major factor in the field of dry color media for molding materials.



Send for our booklet.

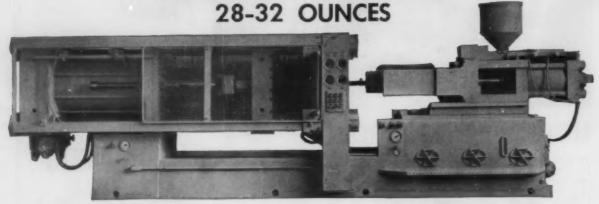
It contains the answer to many of today's coloring problems.

COHNSTAMM & CO. Inc.

Experts in Color Technology for More Than a Century 89 Park Place, New York 7 11-13 Illinois Street, Chicago 11 2632 East 54 Street, Huntington Park, California Branches in other principal cities of the U. S. A. and throughout the world

ANNOUNCING THE NEW IMPCO

MODEL HA28-600



Injection Capacity... .28-32 ounces Injection Pressure..... Machine Cycle.....

SEND FOR BULLETIN P-113 FOR COMPLETE SPECIFICATIONS

IMPROVED

MACHINERY INC.





st desk-type EAT SEALER

with built-in generator

Steps up plastic and bubble sealing production. Two and three KW output.

Write for new bulletin or phone for details!

ERDCO ENGINEERING CORP.

Dept. MP, Addison, III., TErroce 4-1849 Manufacturers of Certified Dielectric & Induction Heating Equipment

MOLD STICKING?

USE

REAL-EASE SILICONE

Release Compound

QUALITY: Highest-Uniform.

EFFICIENCY: Spray tailored for mold release use.

AVAILABILITY: Stocks in key cities.

ECONOMY: Check these prices.

1 to 11 cans \$1.60 per can 1 to 4 cases (12 cans each) \$16.80 per case 5 to 9 " 15.60 " "

25 or more cases 13.20 " "



GIANT 20 OZ. CAN

DON'T DELAY! ORDER TODAY!

BORCO CHEMICALS

3105 N. Cicero Ave.

Chicago 41, III.

research, a discussion of properties at room temperature and at high and low temperatures, and graphs on a number of variations. 10 pages. Price: 7s 6d. (ca. \$1.05). The Electrical Research Assoc., Dorking Rd., Leatherhead, Surrey, England.

Corrugated shipping boxes. Each step in the development of the modern shipper—including study of the product to be packaged, original engineering, exterior design, construction of a pilot box, and testing—are included in a revised edition of "How to Engineer Corrugated Shipping Boxes." 24 pages. Hinde & Dauch, Sandusky, Ohio.

Motors. Bulletin 51B7286G describes latest design features of explosion-proof motors in N.E.M.A. rerated ratings of 1/2 to 30 hp. and in non-rerated ratings of 1/2 to 100 hp.; Bulletin 51B7225D describes totally-enclosed, fancooled motors in N.E.M.A. rerated ratings of 1/2 to 30 hp. and in nonrerated ratings of ½ to 100 hp.; and Bulletin 51B6210G describes open drip-proof motors in N.E.M.A. rerated ratings of 1/2 to 40 hp. and in non-rerated ratings of ½ to 100 hp. Each bulletin contains cut-away views of the motors, tables of ratings and dimensions, and horsepower frame charts. 6 pages each. Allis-Chalmers Manufacturing Co., 1163 S. 70th St., Milwaukee, Wis.

Annunciator systems. Catalog 100B lists typical industry applications, operating sequences, enclosures, mechanical specifications, technical data, and performance features of standard Panalarm annunciator systems. Ordering information and engineering data are "included. 32 pages. Panalarm Div., Panellit, Inc., 7401 N. Hamlin Ave., Skokie, Ill.

Precision casting. "The Shaw Process of Precision Casting: A Review of Developments and Applications" is the title of a new booklet explaining the process that is claimed to produce a precision investment casting similar in accuracy and finish to "lost wax casting" but up to ½-ton and







or Whatever You Need in Expert Custom Molding Contact



SKILL YOU CAN PROFIT BY

Almost 20 years' design and production know-how is available to you at Vichek. Experience gained in countless different jobs may mean improved design and substantial savings for you.

EQUIPMENT YOU CAN PROFIT BY

Complete mold-making service—high speed, modern, injection machines—2 oz. automatics to 48 oz. conventional . . . compression presses of 150 tons to 400 tons . . . these are just a few of many facilities offered by Vlchek that enable us to give customers utmost value.

Write today for complete information and quotation. Benefit by the engineering service available without obligation.

PLASTICS DIVISION

THE VICHEK TOOL COMPANY
3001 East 87th Street • Cleveland 4, Ohio

larger in size, from simple refractory molds utilizing low-cost patterns and equipment. 27 pages. Shaw Process Development Corp., 80 Shore Rd., Port Washington, N.Y.

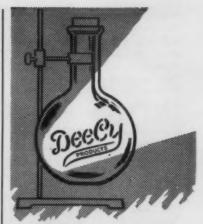
Coated fabric. Pattern card contains swatches of Vynair, a breathable PVC-coated fabric, said to be suitable for the covering of loose foam rubber cushions of three-piece-suites, cushioned chairs, or contemporary stools. Leathercloth Div., Imperial Chemical Industries, Ltd., Hyde, Cheshire, England.

Organic peroxides. Research Report No. 11, "Fire and Explosion Hazards of Organic Peroxides," contains technical information pertinent to these peroxides, in terms of trade names and understandable nomenclature, and their varied chemical characteristics. The report also contains a trade name index. 61 pages. The National Board of Fire Underwriters, 85 John St., New York 38. N. Y.

Layout models. "Models for the Factory Floor" diagrams a number of layout models built to %-in. scale instead of the usual ¼-in. scale. Questions and answers on layout models are also included. Industrial Models, Inc., 2311 Sconset Rd., Wilmington 3, Del.

Slitting equipment. Bulletin No. 569 covers the complete line of Stanat rotary gang slitters for mills, warehouses, and strip users. Included are photographs showing actual slitting operations, tables of cutting capacities, machine specifications, and a section devoted to various types of recoiling equipment and methods. 16 pages. Stanat Manufacturing Co., Inc. 47-28 37th St., Long Island City 1, N. Y.

Polyester film. Brochure discusses the heavy-duty packaging and protective wrapping abilities of Scotchpak heat-sealable polyester film. A table gives physical and chemical properties. 6 pages. Minnesota Mining and Manufacturing Co., 900 Fauquier St., St. Paul 6, Minn.



Plasticizers & Stabilizers

STAFLEX KA

Phthalates

Adipates

Azelates

Sebacates

Ricinoleates

Technical Bulletins and Samples sent on request.



Naugatuck MARVIBOND

Marvinol vinyl-to-metal laminating process



glamorizes
even
everyday
articles

MODERN PRODUCT DESIGN seeks to combine eye-catching beauty with functional durability. And Marvibonded vinyl-to-metal laminates do just that! Two excellent examples are the "Thunderbird" ice chest and picnic jug, manufactured by Poloron Products, Inc.* Their almost indestructible fabric-embossed vinyl finish is fused to aluminum sheets by the Marvibond† Process, then formed into the shells of extremely lightweight, glass-fiber-insulated food and drink containers that are as eye-appealing as they are practical.

Marvibonded laminates enable manufacturers to add the colorful beauty, texture and wear-resistance of vinyl to the structural strength of metal for an ever-widening range of products...from business machines to auto and bus interior panels...from TV cabinets to telephone booths! Sheets of steel, aluminum, magnesium or copper, prefinished by the Marvibond Process, can be shaped, sheared, drilled and punched on standard sheetmetal-working equipment without damage to the flexible vinyl surface.

We do not make Marvibonded laminates or the products shown here, but we have licensed many laminators throughout the country to use the Naugatuckdeveloped Marvibond Process. We'll gladly give you the names and addresses of several licensees near you.

U. S. Pat. No. 2,728,708

Poloron Products, Inc., New Rochelle, N.Y.

For the Plastics Industry, Naugatuck Chemical manufactures MARVINOL® polyvinyl chloride resins, VIBRIN® polyester resins, KRALASTIC® high-impact rubber resins, Curing Agents for epoxide resins and Blowing Agents for foamed plastics.



United States Rubber

Naugatuck Chemical Division
Naugatuck, Connecticut

BRANCHES: Akron • Boston • Gastonia, N.C. • Chicago • Los Angeles • Memphis • New York • Phila.
IN CANADA: Naugatuck Chemicals. Elmirs, Ontario • Rubber Chemicals • Synthetic Rubber •
Plastics • Agricultural Chemicals • Reclaimed Rubber • Latices • Cable Address: Rubexport, N.Y.



From a cold start through a full production run, Sterlco's "fast service" and extremely high degree of sensitivity assure quick warm-up and accurate, automatic mold temperature control for faster production and minimum rejects.

here's why ...

Super-fast 9000 watt unit on each side for quick starts.

Small total water capa-city—no excess thermal curryover either way.

Super-sensitive, accurate HEATING CONTROL with extremely fast reaction time.

Flexible, modulating COOLING CONTROL—



Model 6003

A compact unit designed for permanent installations. (Can be equipped with casters). Requires approximately 50% less floor space than Model 6002 with same



Model 6002

The mobile temperature con-trol unit functioning in lead-ing plastics plants from coast to coast. Ready to operate when connected to electricity, water and drain,

America's "Blue-Chip" **MANUFACTURERS***

order and re-order Sterlco's because they know, want and deserve the BEST.

Send for descriptive bulletins. Do it NOW!







Production and sales figures in 1000 lb.* for September and October 1956

Materials	Total p'd'n first 10 mos. of 1956‡	Total sales first 10 mos. of 1956‡	
Cellulose plastics: ^a Cellulose acetate and mixed ester Sheet, under 0.003 gage Sheets, 0.003 gage and over All other sheets, rods, tubes Molding, extrusion materials Nitrocellulose sheets, rods, tubes Other cellulose plastics	16,314 13,771 6,240 75,001 4,593 4,628	16,395 13,557 6,001 73,995 4,175 4,177	
Phenolic and other tar-acid resins: Molding materials* Bonding and adhesive resins for: Laminating (except plywood) Coated and bonded abrasives Thermal insulation Plywood All other bonding uses Protective-coating resins Resins for all other uses	183,778 53,376 12,651 46,664 36,427 43,596 24,529 28,933	161,506 37,542 13,171 45,770 29,360 41,168 21,460 25,226	
Urea and melamine resins: Textile-treating resins Paper-treating resins Bonding and adhesive resins for: Plywood All other bonding and adhesive uses, including laminating Protective-coating resins Resins for all other uses, including molding	34,636 20,367 85,622 20,795 30,188 73,079	32,777 18,878 80,163 19,702 22,778 70,069	
Styrene resins: Molding materials Protective-coating resins Resins for all other uses	366,896 77,171 85,761	331,515 75,914 86,404	
Vinyl resins, total ^b Polyvinyl chloride and copolymer resins (50% or more polyvinyl chloride) for: Film (resin content) Sheeting (resin content) Molding and extrusion (resin content) Textile and paper treating and coating (resin content) Flooring (resin content) Protective coatings (resin content) All other uses (resin content) All other vinyl resins for: Adhesives (resin content) All other uses (resin content)	613,717	594,034 65,232 46,834 168,532 51,607 53,321 23,207 58,668 31,021 95,612	
Coumarone-indene and petroleum polymer resin:	206,663	203,818	
Polyester resins:	60,335	53,516	
Polyethylene resins:	455,540	416,732	
Miscellaneous: Molding materials ^{a, d} Protective-coating resins ^b Resins for all other uses ^f	35,504 9,043 98,467	32,993 4,558 90,395	

*Dry basis designated unless otherwise specified. †Revised. †Partially estimated. ¶Includes friction materials. *Includes fillers, plasticizers, and extenders. *Production statistics by uses are not representative, as end use may not be known at the time of manufacture. Therefore, only statistics on total production

Production

From statistics compiled by the U. S. Tariff Commission

September†		October‡	
Production	Sales	Production	Sales
1,883 1,503 559 8,579 324 279	1,833 1,450 544 7,888 354 244	1,539 1,621 676 9,390 396 564	1,505 1,633 586 9,575 379 546
15,771†	13,917†	17,971	16,433
5,732 1,093 4,084 3,881 4,133† 2,176 2,904	4,359 1,050 4,181 2,839 3,984† 1,967 2,783	5,930 1,450 5,063 3,808 5,150 2,711 4,121	4,410 1,652 4,850 3,192 5,161 2,070 3,317
2,294 2,200	2,648 1,769	3,442 2,216	3,577 2,035
7,859†	7,764†	9,077	8,412
1,826 2,951	1,843 2,373	2,437 3,481	2,508 2,889
7,581	7,179	8,518	8,348
37,284 6,737 7,030†	30,704 7,200 7,499	37,735 8,110 11,054	35,035 7,434 11,832
60,237	59,458†	67,176	70,992
	7,159 4,194 17,228		8,581 5,341 21,339
	5,198 5,526		6,384 6,790
	2,025 5,945		2,568 5,984
	2,893 9,291		3,231 10,773
20,513	20,538	21,444	21,971
5,369	4,602	6,473	6,169
51,089	40,056	49,110	45,783
3,468 1,026† 9,830	1,026† 561† 1,115		4,349 510 9,645

are given. 'Includes data for spreader and calendering-type resins.'Includes data for acrylic, nylon, and other molding materials. 'Includes data for epichlorohydrin, acrylic, silicone, and other protective-coating resins. 'Includes data for acrylic, rosin modifications, nylon, silicone, and other plastics and resins for miscalianeous uses.



GENERAL ROLL LEAF

General makes a complete line of roll leaf for hot stamping on every type of plastic. General Roll Leaf provides superior workability, finer definition and longer life. Available in the widest assortment of colors as well as genuine gold and imitation gold and silver.

> Free Samples and Illustrated Literature Available on Request

IMMEDIATE DELIVERY and service from warehouses in principal cities coast-to-coast.



ENERAL ROLL LEAF

Convine and Imitation Gold and Silver, Pigment and Atabellic Colors
85-03 57th Ave. Elmhurst, L. I., N. Y. HAvermayer 9-6123
BOSTON • CHICAGO • LOS ANGELES



FOR EVERY APPLICATION!

From PELRON We can supply the chemicals for producing any kind of foam product at room tempera-

We can supply the chemicals for producing any kind of foam product at room temperature without elaborate equipment. Pelron produces polyether prepolymers used in cushioning and bedding; "one-shot" polyesters for sponge and flexible slab applications; and polyester prepolymers for molded automotive crash pads, seat cushioning, and carpeting. We have also developed low priced polyether resins and prepolymers for cushioning and crash padding; resin prepolymers producing semi-rigid, rigid, high temperature resistant, and high density foams for insulating and accoustical applications. Let us, with three years of intensive research already behind us, help you meet your foam requirements. Pelron will gladly develop a resin to meet YOUR needs.



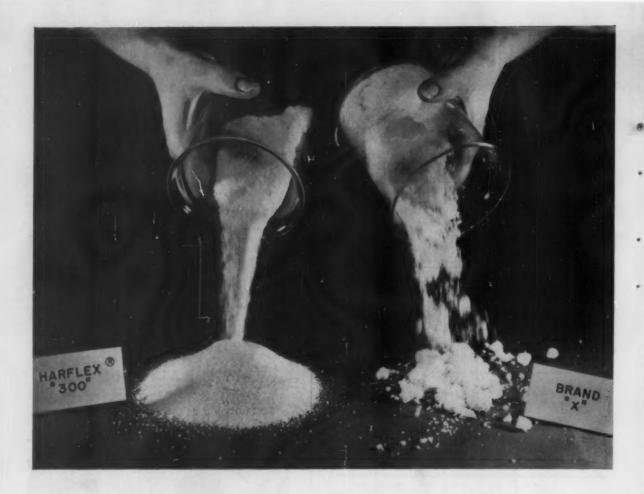




DESCRIBE	YOUR	FOAM	APPLICATION
Name			
Company_			
Address			
City	State		

7847 W. 47th Street

FEBRUARY 1957



HARFLEX® 300

PERMITS A FREE FLOWING DRY BLEND

In a typical test, 64 parts of HARFLEX® 300, preheated to 212°F, were mixed with 100 parts of an easy-processing polyvinyl chloride resin at 212°F. After 30 minutes of thorough agitation, a dry, free flowing powder was obtained which could be put directly into an extruder. When a free flowing dry blend is used directly, as in extrusion operations, it is possible to eliminate or minimize extra operations such as Banbury mixing or roll milling.

HARFLEX® 300 is a permanent polymeric plasticizer, readily adaptable to dry blending. Write for our free technical bulletin that gives full information about HARFLEX® 300. Samples for your test or experimental work are also available at your request.

SEBACATES PHTHALATES ADIPATES



HARCHEM DIVISION

WALLACE & TIERNAN, INC.
25 MAIN STREET, BELLEVILLE 9, NEW JERSEY
IN CANADA: W. C. HARDESTY CO. OF CANADA, LTD., TORONTO

- 1 SELECT the items you want
- (IRCLE the corresponding numbers on the post card
- 3 FILL IN the information requested
- MAIL no postage required

HELPFUL LITERATURE

KE PKLL

There is valuable data — worth dollars and cents to you — in the literature and samples described below.

EQUIPMENT . SUPPLIES . SERVICES

DIALLYL PHTHALATE MOLDING COMPOUND. Bulletin gives physical properties of five grades of diallyl phthalate molding compound. Lists properties of pieces molded from this high-dielectric material, with emphasis on electrical applications. Acme Resin Corp. 18-7011

STATIC NEUTRALIZER MANUAL 8-page illustrated manual discusses the various methods employed to neutralize static electricity on sheeting or film. Describes the "magic wand" neutralizing technique with diagrams, and installation data. Herman H. Sticht Company, Inc. (8-702)

EXTRUSION, INJECTION ACCESSORY UNITS. Illustrated folder describes line of Hopper-dryer units for use with injection presses and automatic Hopper loader units for installation with extrusion extruders. Includes specifications. Thoreson-McCosh, Inc. (8-703)

PANEL HEATERS. Folder describes "Thermomat" heating panels that provide uniform heating at temperatures to 700°F. Illustrates specific application for heating panel. Thermomat Company, Inc. (8-704)

NYLON MOLDING POWDERS. Literature describes, lists specifications for "Nylatron" molding powders for injection molded nylon parts. Includes wear reduction chart. Particularly suitable for gears, cams, rollers and bushings. National Polymer Products, Inc. (8-705)

ELECTRIC OVENS. Illustrated literature gives specifications and prices for a line of ovens with ranges to 1,000°F., including portable, cabinet, walk-in models. Grieve-Hendry Company, Inc. (8-706)

SMAIL HYDRAULIC PRESSES. Illustrated catalog describes line of small air-powered "Hydrolair" hydraulic compression presses, including models of 30, 50, 75, and 100 tons. Includes specifications and description of air-hydraulic intensifier. Elmes Engineering Division, American Steel Foundries.

RELEASE AGENTS. Data sheet describes non-corrosive and non-toxic release agents dispersed in a non-aqueous solvent. Includes specifications. National Aluminate Corp. (8-708)

CARBIDE-TIPPED CIRCULAR SAWS. 8-page folder illustrates and describes carbide-tipped saw blades for specific relation cutting requirements. Manufacturing Co., Inc.

HYDRAULIC PRESSES. Folder describes and illustrates manual, semi-automatic, and automatic platen hydraulic presses with 25 to 200 ton capacities. Discusses special features. K. R. Wilson, Inc. (8-710)

FIUOROCARSON PRODUCTS. Folder describes and fillustrates applications of "Kel-F" fluorocarbon molding and extrusion plastics, dispersions and coating resins, and inks for plastics surfaces. The M. W. Kellogg Company. (8-711)

HOT WORK DIE STEEL Literature contains data on composition features, and characteristics of die steel suitable for applications where dies are subject to heavy pressure or impact while in contact with heat. Includes discussion of general heat treatment of the steel. Firth Sterling. 16-7121

SPRAY MASK PAINTING MACHINE. Folder describes automatic unit for high production spray mask finishing of die-formed and molded parts. Sepanski and Associates. (6-713)

high Density Polyethylene. 16-page booklet describes "Grex" polyethylene resin. Discusses chemical and temperature resistance. Also includes discussion of polymer chemistry. Polymer Chemicals Division, W. R. Grace & Co.

VINYL-CUSHION MACHINE MOUNT. Illustrated 12-page brochure describes a vinylsisal-cork "Air-Loc" pad upon which machines are mounted to absorb vibrations and shock loads. Includes illustrations of applications. Clark-Cutler-McDermott Co.

ELECTRIC MOTORS. Illustrated brochure describes company's line of variable speed electric motors designed for wide range of industrial uses. Discusses speed ranges and speed shifts, Gives specifications, and describes control features. Reliance Electric & Engineering Co. (8-716)

O-RING CATALOG. 12-page catalog lists dimensions and gland designs of line of O-ring seals and gaskets for hydraulic systems, Lists 296 different sizes. Parker Appliance Co. (8-717)

PORTABLE INDUSTRIAL OVENS. Literature contains illustrations, descriptions, and specifications of a line of heavy duty cabinet ovens for production and laboratory work where uniform temperature is important. Grieve-Hendry Company, Inc. (8-718)

CORROSION-RESISTANT PIPE. Catalog illustrated with schematic drawings gives detailed specifications for line of corrosion-proof thermoplastic pipe, fittings, valves, tubing and ducting. Gives properties of the 5 plastic materials from which piping is produced. American Agile Corp. (8-719)

VACUUM FCRMING. 12-page bulletin describes the vacuum forming technique, indicates scope of applications and describes instruction and operational features of a line of vacuum forming equipment. Specifications included. Vacuum Forming Corp. (8-720)

INJECTION MACHINE NOZZIE CATALOG. 48-page catalog provides illustrations, diagrams, and specifications of line of stock replacement and special purpose nozzies. Includes general discussion of characteristics and working parts of nozzies. Injection Molders Supply Co. (8-721)

Fill out and mail this card now

MODERN	PLASTICS
MANUFACTURE	DC' LITERATUR

MANUFACTURERS' LITERATURE SERVICE

Please send me the free Items circled below. I am 🔲 a non-subscriber*

i am 🗌 a subscriber,

B-701 B-702 B-703 B-704 B-705 B-706 B-707 B-708 B-709 B-710 B-711

B-712 B-713 B-714 B-715 B-716 B-717 B-718 B-719 B-720 B-721 B-722

B-723 B-724 B-725 B-726 B-727 B-728 B-729 B-730 B-731 B-732 B-733

B-734 B-735 B-736 B-737 B-738 B-739 B-740 B-741 B-742

off you do not have a personal subscription and would like to receive the next twolve monthly issues plus the next annual Encyclopedia issue (U.S.A. & Canada, 37.00; Pan America 310.00; all others, \$30.00 places check below.

☐ Check enclosed ☐ Send bill

NAME POSITION

COMPANY

STREET STATE ...

(This card cannot be honored after May 1, 1957)



There is valuable data — worth dollars and cents to you in the literature and samples described below.

- SELECT the items you want
- 2 CIRCLE the corresponding numbers on the post card
- 3 FILL IN the information requested
- MAIL no postage required

EQUIPMENT . SUPPLIES . SERVICES

WHITENESS AGENT FOR PLASTICS. Technical data sheet describes a soluble, colorless dye used as a whiteness brightening agent. Can be used in vinyl chloride and copolymers, polystyrene, polyethylene, cellulose acetate. Geigy Industrial Chemicals.

FRACTIONAL HP MOTORS. Illustrated literature describes line of electric motors that provide $\frac{1}{100}$ to $\frac{1}{100}$ hp at 5000 to 18000 rpm. Specifications included, R. A. Boehm Company.

COOLER FOR MOLDING MACHINES. Literature illustrates and describes liquid cooling unit suitable for providing cold water for the jackets of plastics molding machines. Includes illustrations of line of heaters, coolers, and air conditioners. Niagara Blower Company. (8-724)

MEATING PLATENS. Folder illustrates, describes, and includes cross-section diagrams of steam heated platens; includes illustrations of company's hydraulic presses. R. D. Wood Co. (8-725)

PEIMER ON GLASS-REINFORCED PLASTICS.
26-page booklet describes applications for fibrous glass-reinforced plastics. Gives properties of reinforced alkyd, polyester, phenolic, melamine, and polyesters. Contains description of molding processes required. Owens-Corning.

(8-726)

ELECTROFORMED MOLDS. Literature describes the electroforming process. Also discusses company's process for making moulds directly from models without hobbing, heat treating, or polishing. Electromold Corp.

(B-727)

SOLVENT-PROOF ELASTOMER. Folder describes solvent-proof, abrasion-resistant flexible elastomeric material processed from polyvinyl alcohol. Suitable for hose and hose assemblies, molded gaskets and seals. Resistoflex Corp. (8-728)

VINYI STABILIZERS. Folder contains comparison chart providing chemical compositions and principal properties of line of 15 vinyl stabilizers. Discusses specific applications for each. National Lead Company. (9-729)

MOLD RELEASE. Literature describes mold release for injection molding and for compression molding, laminating, casting, reinforced plastics, Available in bulk or spray containers. Vin-Rock Inc. (8-730)

MIXING-REDUCING PARTICLES. Folder illustrates and describes mixer for dispersion of liquids and free-flowing dissimilar solids, impact mill for particle reduction, and filter systems for dust recovery. Entoleter Division, Safety Industries, Inc. 12731/

SPEAYING AND COATING EQUIPMENT. 8-page illustrated booklet describes machine that applies electrically charged sprays of plastisol, paints, and synthetic coatings to plastics and non-plastics products. Scientific Electric. (8-732)

INFRARED OVEN FOR DRYING AND LAMI-NATING. Illustrated report describes the use of infrared oven for drying and curing resin-impregnated cloth or paper, prior to laminating. Edwin L. Wiegand. (8-733) TRANSPARENT SHEETING. Bulletin describes flat and corrugated rigid transparent sheets up to % in, thick for use as windows, partitions, and display. Lists stock sizes available, gives physical and chemical properties. Seibering Rubber Co.

MACHINING PLASTIC COMPONENTS. Illustrated literature describes New York company's custom precision machining of plastic components for electrical, chemical, and mechanical applications. Discusses fabrication of polystyrene, Tesson, Formica, Kel-F, and nylon. Tri-Point Manufacturing & Developing Co. (8-735)

ROTARY GRANULATORS. Folder illustrates and describes two rotary granulators for plastics materials. Also describes granulator equipped with cooling fan for working heat-sensitive or warm plastics. Includes specifications, Lukens Laboratories. (8-736)

ELECTRIC RADIANT HEATERS. Folder illustrates, describes, and gives specifications for fused quartz electric radiant heaters available in single or multiple units, panels, or complete oven assemblies. Cleveland Process Co. (8-737)

MACHINING LAMINATES. Illustrated manual describes techniques and machinery for sawing, turning, boring, threading, drilling, punching, and gear cutting of high pressure laminates. Synthame Corporation. (8-738)

INJECTION MOLDING PRESSES. Illustrated literature describes company's 3 and 6 oz. injection presses. Includes detailed specifications. The Fellows Gear Shaper Co. (8-739)

FOAMED POLYSTYRENE MANUAL. Illustrated manual presents 38-page comprehensive information on properties, characteristics, and applications for "Dylite" expandable polystyrene. Gives detailed molding and fabricating information. Koppers Co., Inc. 18-740i

PLASTICS PIPE STUDY. 64-page technical study describes materials used in plastics pipe, analyzes costs involved in manufacture and installation, and compares properties of plastics pipe with metal pipe. Monsanto Chemical Company. (8-741)

POLYVINYI CHLORIDE RESIN. 32-page illustrated brochure describes properties, processing data, applications of "Vipla" polyvinyl chloride resin. Includes corrosion resistance charts of unplasticized PVC. Chemore Corporation. 8-7421

Fill out and mall this card now



No Postage Stamp Necessary If Mailed in the United States

BUSINESS REPLY CARD

First Class Parmit 2456 (Sac. 34.9, P.L. & R.), New York, N.Y.

MODERN PLASTICS

Village Station Box No. 103 NEW YORK 14, N. Y.



BEACH

BALLS

PLASTIC GLOVES

Saves as much as 2 cents a pound on the finished product

Conoco H-300 meets the exacting requirements of the quality-minded as well as the cost-conscious formulator. It can replace up to 25% of the total plasticizer required with eminently desirable results. In addition to the notable advantages mentioned below, Conoco H-300 may save you as much as 2 cents a pound on finished products.

Other Outstanding Advantages of Conoco H-300

EXCEPTIONAL LIGHT STABILITY. Tests prove that films containing Conoco H-300 show light resistance equal to or better than those with no extenders—a unique contribution to the field of secondary plasticizers.

SUPERIOR VISCOSITY CONTROL. Mixtures containing Conoco H-300 have appreciably lower initial and aged viscosities.

IMPROVED MIXING. Formulations are more readily mixed because of fast wetting and internal lubricating properties.

UNUSUAL LOW-TEMPERATURE FLEXIBILITY. Marked improvement in low-temperature flexibility shown in films made with Conoco H-300.



Write for your copy of the new booklet on Conoco H-300, the Extender of Profit: Continental Oil Company, Petrochemical Department, Division P-2, 630 Fifth Avenue, New York 20, N. Y.—1353 No. North Branch Street, Chicago, Illinois.

© 1956, Continental Oil Company



Petrochemical know-how from the ground up!

CONTINENTAL OIL COMPANY

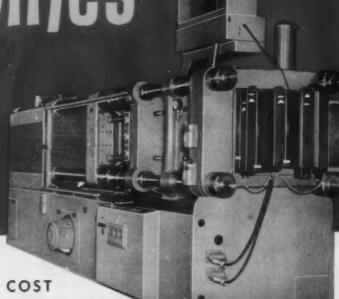
SWIMMING POOLS

AWNINGS

UPHOLSTERY

FABRICS

machines you



- LOWEST INITIAL COST
- LOWEST OPERATING COST
- LOWEST MAINTENANCE COST

plus:





The Platform

Where readers may voice their opinions on any phase of or problem in the plastics industries, controversial or otherwise. The editors of Modern Plastics take no responsibility for opinions expressed in letters herein.

The Editor, MODERN PLASTICS:

With the increased competition among material companies and with an increase in the variety of materials offered has come an extremely serious situation for suppliers of equipment to the injection molding industry.

The problem is briefly this: a molder is running a given job of a given plastic-a plastic that usually has been very effectively presold by the vast advertising campaigns of the powder company concerned, often directed at the end user himself. Molding trouble develops. The material people are called in. Their technical service force is then marshalled, and their elaborate laboratory facilities are rallied to work out a practical solution. With increasing frequency of late, the recommendations of the material people have been directed not toward improving the molding powder but at the equipment used to mold it. Heating cylinders, nozzles, ovens, materials handling, etc., are all critically scrutinized.

Frequently in recent months the molder has been given to understand that if his equipment is modified, or new equipment (recommended by the material company) substituted, the molding trouble will disappear. Unfortunately these suggestions are often impractical or highly theoretical in nature, and serve only to give the powder salesman time to get back to his office, leaving the molder still struggling with the real problem: batch to batch variation in molding powders.

The molder then consults with the equipment people, and when they are finally brought in, it soon develops that a simple change of molding material to that of another supplier immediately eliminates all the molding difficulty; the standard equipment then performs quite satisfactorily, and the molding problems only return when the original powder is tried.

This ready solution is placing the equipment supplier in a position tantamount to recommending one make of powder over another. Furthermore, when we analyze the recommendations of the various technical service representatives of material makers, we often find them contradicting the various suggestions of their competitors! Again the equipment supplier is asked to decide which suggested solution, which molding technique, which heater design, which nozzle design, which hopper loader, etc., is correct.

The equipment supplier is in the invidious position of knowing how the problem was solved in another plant, and to save the molder time and money and needless investment in special equipment he must suggest a change of powder, as at least one possible solution to the problem.

It is a very serious thing for an equipment man to suggest that molding trouble (contamination, decomposition, streaks, burning, etc.) may rest in the molding material itself, for molding powder is the end product of a long and inherently complicated manufacturing process. The material companies have a tremendous investment in conventional processing equipment to prove that their powder will run, and it's pretty hard for a small molder to counter with his own positive experience to the contrary. The fact remains, however, that we are in a period where new and untried varieties of molding powder are bringing unknowns into the in-

FINE ORGANICS SLIP-EZE

Proven by more than
40,000,000 lbs. of
extrusions as
THE MOST
ADVANCED
SLIPPING AGENT
for the Extrusion
and Injection Molding
of
POLYETHYLENE

SLIP-EZE

GIVES
NO TACKINESS
NO GREASINESS
NO DISCOLORATION
and Provides an
excellent
ANTI-STATIC
finish

SLIP-EZE

is easy to use and economical

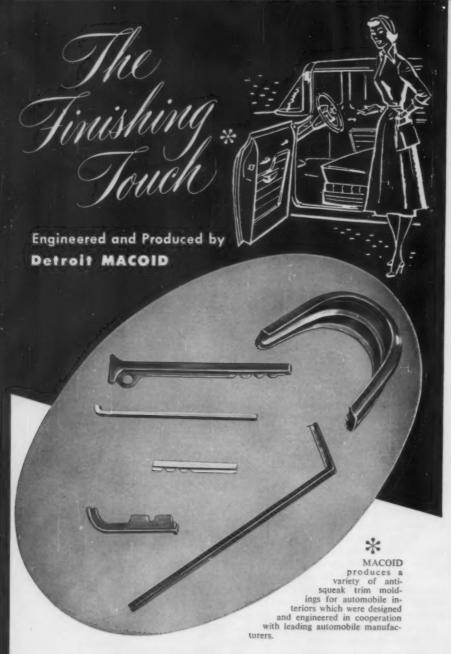
Write Today for TECHNICAL DATA SHEET on SLIP-EZE



APPROVED BY FOOD AND DRUG ADMINISTRATION

FINE ORGANICS, Inc.

211 East 19th St. - New York 3, N. Y.



Producing intricate injection molded trim for automobile interiors is only one of MACOID'S many specialties.

Whatever the product—if it can be made of thermoplastics there's a team of MACOID specialists ready to step in and do the job quickly, efficiently at any stage of development!

If you'd like, MACOID stylists can translate your rough sketch into a practical, finished design. Or MACOID'S engineering staff can convert your product specifications into working drawings.

And – MACOID is equipped to maintain *quality standards* at the lowest possible per-unit cost. MACOID'S extrusion and injection molding facilities are among the most efficient in the industry.

For a way to do it better with plastics-consult Detroit MACOID.

DETROIT MACOID CORPORATION

12340 CLOVERDALE, DETROIT 4, MICHIGAN

Originators of Dry Process Plastics Extrusion

EXTRUSION AND INJECTION MOLDING

jection molding field at greatly accelerated rates, and this is putting an intolerable burden of expense on the equipment supplier.

The equipment supplier has one profit on a piece of equipment. The molder and the powder maker both have a continuing source of profit on their manufactured goods. Where the equipment supplier is repeatedly called on to service and justify the performance of his equipment, (on different materials), his existing margins are proving insufficient. The net result to the molder is going to be still further increases in costs of his plant equipment because of rising service costs of the machinery manufacturer, whereas the real trouble lies with varying imperfections and defects in the molding characteristics of the powder itself often changing from batch to batch. To make sales capital out of this situation, the material maker rallies such an array of processing equipment and technical aides that the molder dare not talk back. So he calls in the machinery man. And we pass the buck! We have to!

If our suggestion is "Change your material supplier," the equipment maker is in effect directly criticizing the product of one specific powder company. But this is just about what the powder people have already done to the equipment supplier with their suggestions for equipment modifications and changes to meet the molding difficulty brought about by the material itself. Almost without exception the machine and process in question have been previously perfectly adequate for another powder!

It is the molder who really pays for molding powder defects: in down-time, trouble calls, purging, scrap, extra inspection, etc.

It isn't the province of an equipment supplier to pinpoint this problem, but when the molder changes his equipment buying habits, when he radically modifies his equipment specifications, or delays buying equipment because of "technical" information furnished by the material suppliers, it is time for the equipment maker to analyze just what is really happening, with the hope

don't let your sales manager

he a



"PACKAGING ORPHAN"

In your company he may be called the Sales Manager . . . or the Merchandise Manager; the title isn't important. The chap we're talking about is the one whose interest in the packaging function sometimes may be considered secondary, while the successful completion of his duties depends in a significant measure on the appearance of your company's packages and the protection they give to your products.

If this man, whatever his title may be, doesn't get his own personal copy of Modern Packaging every month to keep him up-to-date, you've a "packaging orphan" on your hands. While he should be, he probably isn't up on all the latest techniques of package merchandising, on how to package to obtain sales in multiple units, on what's "hot" in protective and decorative packaging. . . .

Modern Packaging isn't a cure-all for this man, but it will keep him posted on the important packaging developments he ought to know about. A twelve month subscription—including the famous annual Encyclopedia Issue—for him costs only \$7.00 in the United States and Canada, \$10.00 in Pan America, \$20.00 elsewhere. Write today; we'll enter his subscription immediately and bill your company later.

SUBSCRIPTION DEPARTMENT

MODERN PACKAGING

575 Madison Avenue New York 22, N. Y. of saving the molder further unnecessary expense.

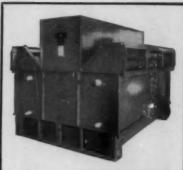
If material makers promptly acknowledged the source of the trouble instead of going through a long, involved, and costly procedure by forcing the molder and machinery supplier to prove the material defective, the industry would save vast sums of money (and production time) every week.

The equipment supplier with a one-profit transaction is expected to make good on his product, so why can't the material people make good with their continuing profit? When the equipment maker proves the molding compound at fault (as we are increasingly doing merely by switching powders) he has certainly proven his point—but always at considerable expense, both to himself and to the molder.

When the powder people, in their race with each other on material specifications, begin to encroach on the equipment field and recommend new heaters, new nozzles, new drying ovens of their own pet design, and often not proven in actual production, then the equipment maker must be heard from, because then his business is being seriously and directly affected by the repeated appearance of bad batches of molding powders.

If the present situation is not corrected the equipment supplier has only two alternatives: 1) Sharply increase his price to cover his growing share of processing costs in proving that his equipment is not defective, or, 2) devote a large amount of time and money to study of moldability of various formulations so he can make positive recommendations on various powders and be able to pinpoint the offending materials by name and number. He will then be invading the province of the powder suppliers in the same way they are presently invading the equipment field, and as at present-it will still be the molder who foots the bill. That is why it would seem to be up to the molder to say to material makers-Stop Passing the Buck!

A. R. Morse, President, Injection Molders Supply Co.



NIAGARA SECTIONAL

Aero HEAT EXCHANGER

gives close temperature

control, saves you

LABOR, Power, Water

- Because the new design improves the heat transfer to the out-door air by evaporation.
- Because new features keep your equipment working for long life with "new plant" efficiency . . . always full capacity.
- Because you save 95% of cooling water cost.

You get faster, more accurate cooling of industrial fluids to specified temperatures.

You improve your quality of production by removing heat at the rate of input.

You save labor in upkeep. With full access to all interior parts and piping you see everything in easy inspections. You head off dirt accumulation and corrosion. Casing panels are removable without moving the coils. The coils can be cleaned from both sides.

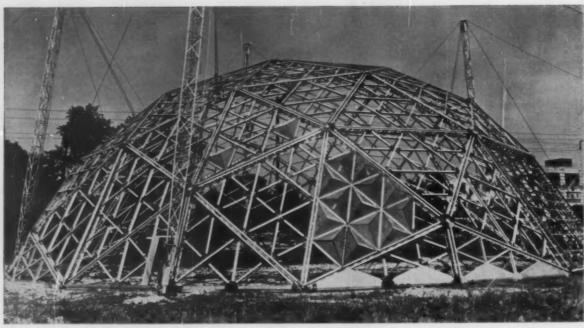
First cost is low; freight is low because of the lowest space/weight ratio; you save much labor in erection. Capacity range is 7,000,000 to 18,000,000 Btu/hr. No other heat exchange method gives you so much saving in money and convenience.

Write for Niagara Bulletin No. 132

NIAGARA BLOWER COMPANY

Dept. M.L., 405 Lexington Ave. NEW YORK 17, N. Y.

District Engineers in Principal Cities of U.S. and Canada



LARGEST CLEARSPAN DOME yet built with HETRON skin is this 117-foot geodesic dome, to be tested by U.S. Marine Corps as portable hangar for jet planes. Fabricator is Washington Aluminum Company, near Baltimore, Md.

How idea men are using HETRON® polyester

HETRON provides wind-resistant, fire-retardant skin for jet fighter hangar

Outstanding strength, excellent molding properties, the big *plus* of inherent fire retardance—these are a few of the properties of HETRON which are appealing to men with ideas in plastics.

Like the builders of this geodesic dome to house jet fighters, for example. They

Physical Property		Rigid Resins		Semi- rigid Resin
		HETRON 92	Avg. 10 Others	HETRON 32A
Flexural Strength, PSIx103	Room Temp.	38.8	36.4	41.8
	180°F.	25.0	18.6	23.5
Flexural Modulus, PSix10 ^a	Room Temp.	1.88	1.61	1.82
	180°F.	0.90	0.79	0.85

1. When high flexurals are important. You get extra flexural strength with HETRON. Other advantages: unusually high impact strength; very high heat resistance; excellent tensile strength; very low water absorption.

needed a material which could withstand winds up to 150 mph. A material which would mold to critical tolerances. A material which would protect men and jet planes against fire. They chose HETRON.

Below are three more of hundreds of ways HETRON polyester resins are helping



2. When your product must meet building codes. When you need specific flame-spread data, you can get HETRON-based building materials with Underwriters' listing and label and Factory Mutual seal of approval.

to bring new ideas to reality.

To discover how well HETRON can meet your particular design requirements, send for a complete data file on these resins. We'll also send a list of reputable fabricators working with HETRON.



3. For aircraft. Some Hetron resins, including semi-rigid Hetron 32A, are manufactured to meet MIL-R-7575A, Types I, II, and III.



DUREZ PLASTICS DIVISION

HOOKER ELECTROCHEMICAL COMPANY

3002 Walck Road, North Tonawanda, New York



Molded one-piece reinforced plastics awnings

As a modern architectural innovation that combines attractiveness with usefulness, rigid-type awnings either molded of reinforced plastics or fabricated of reinforced plastics corrugated sheet are replacing in an increasing percentage the old-fashioned flexible awnings based on fabric materials.

One development that may help accelerate the trend is the recent introduction in Canada of a new type of polyester-glass awning molded in one piece. As contrasted to other types of awnings that require supporting metal framework, the one-piece construction on the new model eliminates most of the loose parts, bolts, etc., that are the primary cause of noise and vibration on windy days.

When installing the awning, stainless steel clips are simply attached above the window and the one-piece awning is slipped into place. Stainless steel brackets are used to anchor the awning firmly against high winds.

Because the awnings are vented to prevent the accumulation of hot air next to the window and because of the thermal insulation properties of the polyester-glass laminate, the awnings give a large measure of protection against summer heat; at the same time, their translucency admits a satisfactory amount of light.

The awnings are also light in weight (a normal 6 ft. wide awning weighs only 15 lb.), corrosion and rot resistant, and completely dentproof. By eliminating all loose parts from the design of the awning and since color is integral with the piece, all maintenance work is reduced to the barest minimum.

The reinforced plastic awnings are produced by a hand lay-up technique in a wide variety of widths, depths, and pitches to meet individual home requirements. They are also available in a wide range of light pastel shades that allow soft, diffused light to enter the house, but prevent the harmful rays of the sun from damaging furniture, rugs, drapes, etc.

Credits: Awnings are molded and marketed by Snyder Industries, Brantford, Ontario, Canada; fibrous glass supplied by Fiberglas Canada Ltd., Toronto; Vibrin polyester resin supplied by Naugatuck Chemicals, Div. of Dominion Rubber Co., Ltd.



Translucent polyester-glass awnings, in light pastel shades, are molded in one piece, can be taken down in a few seconds

Do You Have A Deburring Headache?

GET THE FACTS ABOUT

CRATEX RUBBERIZED ABRASIVES

"The World's Best For Industrial Use"

Exceptionally superior and unparalleled for:

DEBURRING, SMOOTHING, CLEANING and POLISHING operations after dimensional shaping

For removing rust, heat-marks, tarnish, fatigue lines, scratches, excess solder, corrosion and other surface defects: for blending-in polishing welded seams, final sharpening and polishing to Justre-like finish.



CRATEX IS MADE IN FOUR DIFFERENT GRITS Coarse Grit to Extra Fine in WHEELS · POINTS · BLOCKS STICKS · CONES

For Machine or Manual Application on the broadest range of Hard and Soft METALS and other Materials

Backed by over 30 years industrial, professional and technical application, CRATEX Rubberized Abrasives are widely used nationally and in foreign countries. Made from "premium quality chemical rubber bonds" pressure-molded into uniform textures without hard or soft spots—resilient to absorb shock—ready for instant use—offer uniform controlled "cushioned action" with ease of manipulation for dimensional accuracy, without loss of tolerances.

OPERATE SAFELY, EFFECTIVELY AT SPEEDS UP TO 5,500 S.F.P.M.

Send for comprehensive illustrated catalog learn how CRATEX Rubberized Abrasives can cut your costs, speed production and insure quality results. Sold at leading industrial supply dealers.

CRATEX MANUFACTURING CO. 81 Natoma St., Sun Francisco 5, Calif.



buyers

of Plastics Scrap and Surplus Molding Powders

· suppliers

of Polystyrene, Polyethylene, Vinyl, Cellulose Acetate, Nylon and all other thermoplastics.

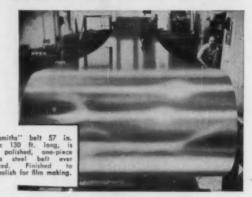
export and import

A department with complete world wide service

GERALD F. BAMBERGER, President 120 East 56th St., New York 22, N. Y., U. S. A. Tel: PLaza 1-4280 Cable Address: INPLAKO

OUR ONLY FUNCTION IS TO SAVE YOU MONEY

Polished Endless Stainless Belt PROCESSES AS IT CONVEYS!



- Produces automatic contact gloss
- Improves setting
- · Speeds cooling and conditioning

Available in extra-wide sizes and Available in extra-wide sizes and any length, for continuous "belt-processing" of plastics, film, foam rubber, latex, resins, leather, compounds, coatings and laminated work. Stainless steel (18-8), one piece, no center seam, width and camber controlled. Consult our engineers. Metalsmiths, 558 White St., Orange, N. J.

METALSMITHS STAINLESS STEEL ENDLESS CONVEYOR BELTS

ELECTRONIC HEAT SEALING FOR PLASTICS SEALOMATIC ...





SEALOMATIC ELECTRONICS CORPORATION

429 KENT AVENUE

BROOKLYN 11, N. V.

EVergreen 8-9413

Boston, Mass. • Chicago, III. • Ft. Worth, Texas • Georgia • Los Angeles, Cal. • Mexico City • Montreal • Toronto



PVC valve will withstand high temperature and pressure conditions

Industrial valves

A new series of general-purpose rigid polyvinyl chloride valves have been developed by the Chemtrol Corp., Lynwood, Calif., to provide excellent corrosion reto provide excellent corrosion resistance, outstanding and constant flow characteristics, and immuaction. The valves operate up to 170 p.s.i., continuous duty; in lower pressure systems the valves may be used at temperatures up to 170° F., or higher for intermittent duty.

The valves are available in two basic types: the Micro-Meter needle valve and the Micro-Flow globe valve. Both valve types also have component parts made of fluorocarbons. Thus, the needle valve is equipped with a Kel-F needle designed to provide a positive seat with fingertip control. The globe valve uses a Teflon seating disk to prevent any possibility of the disk sticking when the valve is opened.

The valves are recommended for a wide variety of applications in general chemical handling, water treatment, oil refineries, food processing, power plants, and sanitary equipment.

Chemtrol valves are available in 1/8 and 1/4 in. pipe sizes and may be used to great advantage with alloy metal tubing where temperatures and pressures permit such utilization.



- Embossing rell changes made in 10 to 15 minutes.
 Speeds up to 36 yards per minute.
- No adjustments necessary after roll change. (NO MESSY GEARS TO CHANGE.)
- Electrically heated rolls deliver aren temperature across entire width of web.
- EIGHT preheating rolls 6½" die. TEFLON covered with 6,000 Watt Heaters.
 FOUR water cooled rolls chrome plated with two rubber
- pressure rells. 81/2" dia.

 Heat Splicer seals from 2 to 20 gauge with J BOX
- pinch rolls and VARI-DRIVE.

 DUAL take-up bars knife edge with friction clutches
- and four let off bars.

 Price for standard 60" Medel \$9,990.00.
 Laminates: Mylar to Plastic Plastic to Plastic Page

Laminates: Mylar to Plastic, Plastic to Plastic, Paper to Plastic, Cloth to Plastic etc.

Write for Illustrated Literature

T&M MACHINE AND TOOL CORP.

15 Greenpoint Avenue Brooklyn 22, N. Y.

EVergreen 3-1011



World Wide Sales Offices of AMCEL and PAN AMCEL for Plastic and Resin Products of

Celanese CORPORATION OF AMERICA

Argentine, Buenos AiresImportadora Téchnica Industrial S.R.L.
Australia, Sydnoy, N.S.W. James Hardie Trading Co. (Pty.) Ltd.
Australia, Melbourne
Austria, Vienna X1XEugen Farber
Belgium, Brussels
Brazil, Seo Paulo"Brasimet" Comercio e Industria S.A.
Canada, Montreal, P.Q°Canadian Chemical Co., Ltd.
Canada, Toronto, Ont°Canadian Chemical Co., Ltd.
Canada, Vancouver, B.C*Canadian Chemical Co., Ltd.
Chile, Santiago
Colombia, Cali
Costa Rica, San Jose Servicios Técnicos
Cuba, HavanaLainz y Compañía
Denmark, Copenhagen
Ecuador, QuitoSchiller & Cia.
France, ParisLoiret and Haentjens††
Holland, The Hague Handelsmaatschappij Vos & Co.++
Hong KongOptorg Co. (Malaya) Ltd.
India, Bombay 26
Israel, Tel-AvivE. Huppert
Italy, MilanoUsvico††
Japan, TokyoPercy Broen††
Japan, TokyoA. R. Brown, McFarlane and Co., Ltd.†
Korea, SeoulBando Trading Co.
Mexico, Mexico D.F°Celanese Mexicana, S.A.
New Zealand, Auckland
Peru, LimaGeorge Checkley
Philippines, Manila
Singapore
So. Africa, JohannesburgJ. J. Allmann Sales Corp.
Switzerland, BasleChemische Fabrik Schweizerhall
Taiwan (Formosa), TaipeiDah Chung Trading Co.
Uruguay, MontevideoArmando Bachman Suc.
Venezuela, Caracas°Celanese Venezulana, S.A.
*Affiliated Companies—Calonese Corporation of America

Amcel and Pan Amcel offer these plastic products of Celanese Corporation of America

Cast and Extruded Acetate Film and Sheet Cellulose Acetate Molding Compounds Polyvinyl Acetate Emulsions Cellulose Propionate Molding Compound Polyester Resins

AMCEL CO., INC. and PAN AMCEL CO., INC. 180 Madison Ave., New York 16 Affiliates of Celanese Corporation of America

For latest Celanese Plastics Information see ad on page 9.

Over 360 styrene parts in model boat

The fact that over 360 intricate and detailed molded styrene parts go into the model of the Mississippi river boat, "Robert E. Lee," marks this job as one of the more ambitious projects being undertaken by the fast-growing do-it-yourself hobby kit field.

Each of the pieces in the kit, from tiny belaying pins to the two-piece hull of the boat, has been painstakingly scaled down so that the finished 22-in. model is an exact miniature replica of the original. According to the company, almost two years of intensive research, months of designing and model making, and many more months of involved tooling—at an estimated cost of \$65,000—went into the final preparation of the model.

Because of the ease of moldability of styrene—and despite the intricacies of the various parts the entire kit sells for only \$9.95.

Nine molds are used to turn out all the parts in the kit. These molds range from a two-cavity mold for the two halves of the boat hull (the largest pieces in the model) to a 187-cavity mold that accommodates most of the very small pieces, including steering wheel, barrels, ladders, railings, etc. With one exception, all of the molds are run in a battery of 8-oz. and 12-oz. injection molding machines. The exception is an 18-cavity mold run in a 2-oz. fully-automatic machine. Since four shots from this mold are used in each set (only one shot is used from each of the other eight molds), faster production is necessary.

The shots as they come from the mold, complete with sprues and runners, are immediately packed in transparent film bags and carried by conveyor belt from the molding machine to a central assembly point. None of the parts are degated. Instead, the runners serve as a convenient means for keeping the many small pieces in the set separated and easy to find when they are ready to be used Since all of the molded pieces are pinpoint gated, the model maker can easily snap the desired piece off the runner without breaking it.

Credits: Molded and marketed by Pyro Plastics, Union, N. J., using Lustrex styrene supplied by Monsanto Chemical Co., injection molding machines by Lester-Phoenix, Inc.



Ease of moldability of styrene permits marketing of model river boat at a moderate price, despite the fact that it contains over 360 intricate and detailed parts. Each piece has been expertly scaled down so that the model is an exact replica of the original





THE MARK OF QUALITY

Wheelco Instruments

for close control at high temp: Jennings specifies Capacitrols

Injection, extrusion, and vacuum forming equipment manufacturers and machine users throughout the country have expressed their preference for Wheelco in the only way that counts—orders and repeat orders. Wherever temperature control instruments are used, you'll find Wheelco!

Product uniformity and continuous operation without waste of raw material are essential to profits in applying paste Teflon to wire. To help insure that the Jennings Teflon Wire Insulator Extruder fulfills these exacting requirements, Jennings Machine Corp. of Philadelphia specifies Wheelco Model 293 Capacitrol temperature controls. Attainable temperature in the sinter zone of the Jennings extruder is 1600 deg F.

The Wheelco Model 293 Capacitrol eliminates overshoot and underrun of the control point, making certain that every inch of Teflon is applied at exactly the same high temperature. Dependable performance eliminates costly shutdowns. Plug-in, easy-access design makes service fast and simple. Maintenance is minimized by sturdy, simple construction from first-quality materials. Wheelco's long experience in the plastics field, wide variety of job-specialized controls, expert, dependable engineering service, and free training schools for operators are a unique combination of advantages for you. Investigate today. Call our nearby field engineer about any plastics problem.



WHEELCO CAPACITROL MODEL 293

Precision straight-line control and low operating costs are offered by this completely self-contained indicating deflection-type instrument. Features plug-in terminals and voltage selector. Reliable, no-contact "Electronic Link" eliminates mechanical wear. Front-accessible for easy maintenance. Reliable control to 3000° F. available. On-off, or straight-line proportioning. Send for Bulletin F-5720.

WHEELCO INSTRUMENTS DIVISION

Barber-Colman Company

DEPT. N, 1517 ROCK STREET, ROCKFORD, ILLINOIS BARBER-COLMAN of CANADA, Ltd., Dept. K, Toronto and Montreal, Canada

NYLON PLASTIC reduces kitchen noise.



Sinko Produces Nylon Parts That Give Years of Economical, Trouble-free Service

Pictured are 3 Sinko Nylon cabinet rollers and a drawer skid-block that are being used successfully by several leading manufacturers of fine kitchen equipment. Sinko Nylon was selected after a series of exhaustive tests had proven its superiority in every respect. In one experiment a small drawer equipped with Sinko Nylon rollers was loaded and automatically operated the equivalent of a normal 200 years service. Upon examination the Sinko Nylon rollers showed little sign of

You too should investigate the many advantages Sinko Nylon offers, among them-resistance to wear and to shock loads, to moisture, chemicals and to temperature; and its smooth-gliding, self-lubricating properties.

SINKO MOLDS ALL THERMOPLASTICS FROM 4 TO 100 OZ.

SINKO MANUFACTURING & TOOL CO. 7310 W. Wilson Ave. Chicago 31, III.

ORGANIC PEROXIDES

DI-t-BUTYL PEROXIDE

STABLE, LIQUID POLYMERIZATION CATALYST FOR USE AT TEMPERATURES ABOVE 100°C

ASSAY - 97% (MIN.)

WAREHOUSE STOCKS CONVENIENTLY LOCATED THROUGHOUT THE COUNTRY



LUCIDOL DIVISION WALLACE & TIERNAN INCORPORATED **BUFFALO 5, NEW YORK**

TRY SHEARING

It may be just what you need to reduce costs and do a better cutting job.

It depends upon the type of plastics or composition sheets you are using. With some of them you can get a smooth, clean, accurate cut, and of course, shearing is much faster.

But, it may take a bit of testing to find the combination of features that will give you the results you want. Wysong will gladly make these tests for you without cost or obligation.

Send a sample of your material to be sheared to Wysong. You'll receive their engineers' recommendations, plus a sample cut of your own material.



mild steel, cutting length 6 feet.

Wysong builds a complete line of power, air-power, and foot-power squaring shears. Write for full information.

Buy a Wysong ... Its Miles Ahead WYSONG & MILES CO. . GREENSBORG, M. C.



Pigmented and clear materials show pipe quality

Pipe quality seen at a glance

To point up product quality visually, one extruder of polyethylene pipe has hit upon an unusual combination of pigmented black and clear materials.

Pigmenting polyethylene with 2 to 21/2% of carbon black contributes greatly to the aging and weathering properties of extruded pipe. But it also makes it possible to conceal the use of reprocessed and off-grade materials because of the tremendous hiding power of the pigment. When such materials are mixed with carbon black and extruded into pipe, the lower quality is not apparent until the pipe fails in service.

The problem, therefore, was to take advantage of the improved properties bestowed by carbon black and yet to market a black pipe that the customer could see was extruded of high quality material. Western Plastics Corp., Hastings, Neb., solved it in this way: The company's Klearcor pipe is produced with a thin, black pigmented jacket and a core of clear material, extruded simultaneously. Thus a glance at the end of any section of the pipe shows immediately the clarity of the virgin material that forms the inner wall of the pipe, surrounded by the protective sheath of carbon black pigmented material. The company guarantees that the outer sheath and inner core will never separate.

Klearcor pipe is currently being produced in iron pipe sizes and with pressure ratings of 75, 100, and 125 pounds. It is also made as joined parallel pipes for water well tubing.



New Patapar Releasing Parchments



As a casting sheet for polyrethane foams, Patapar give smooth satin finish.





peel off easily from pressure sensitive and tacky surfaces

Effective releasing action in almost any situation is provided by new types of PATAPAR RELEASING PARCHMENTS. Features of these Patapars include: dense, fiber-free texture - high resistance to penetration or migration of oil and softeners - permanent releasing action. They are totally inert to any surfaces they contact.

Patapar Releasing Parchments show excellent performance in many processes involving:

- Synthetic rubbers
- Polyurethane foams Organosols
- Polyesters
- Vinyls
- Organic adhesives
- Phenolics
- · Acrylics

A brochure of testing samples and detailed information is available on request. If desired, we will give technical assistance and consultation on releasing problems. Write us on your business letterhead.



HEADQUARTERS FOR VEGETABLE PARCHMENT SINCE 188





UPS SALES 22 TO 56%



Ajax Comb Co. issues 1-year guarantee against breakage. Their guarantee label must hold on teeth of combs, hold on cases -lift off-leave no sticky residue. A no-moistening 'Able-Stik' label fills the bill; fills the till, too, with big sales-gain.

LABELS USED FOR TOY'S CONTROL PANELS



Park Plastics Co. wants realistic controlpanels on its guided missile toy. Gluing slows production; molding gives only a "shadow" effect. But pressure-sensitive 'Able-Stik' labels give color-richness, firm adhesion, fast low-cost attaching with elec-

Sales offices: Boston, Detroit, Phila.

'Able Labels' are mfd. and distributed in Ohio by Allen Hollander Midwest Corp., 812 Huron Rd., Cleveland 15, SUperior 1-0736.

WHICH OF THESE WOULD YOU LIKE? Clip coupon to letterhead and mail

- ☐ 15 CASE STUDIES showing interesting uses of pressure-sensitive labels.
 - ☐ THE "ABLE LABELER"—4-times-a-year newsletter-keeps feeding you fresh ideas.
 - HISTORY OF LABELS By Stanley C. Hollander, Ph.D., Univ. of Minnesota.
- ☐ INTERESTED IN DEMONSTRATION. AND REAL PROPERTY AND REAL PRO



or mark any product

Dept. PL, 385 Gerard Avenue New York 51, N. Y. MOtt Haven 5-1818

Reinforced phenolic housing for hand drill

Color for added sales appeal, desirable electrical and thermal insulating properties, light weight, production economies, and unusual resistance to damage were among the chief advantages gained by The United States Electrical Tool Co., Cincinnati, Ohio, in specifying a molded reinforced phenolic housing for its recently introduced 1/4-in. Nu-Drill. Supplementing the company's established line of heavy-duty items sold to the mill supply and industrial field, the new portable drill with its handy "pistol grip" design is particularly appealing to the home craftsman.

In adopting the impact-resistant plastic housing rather than a cast aluminum case, the manufacturer was interested in the fact that the plastic case could be offered in a choice of red, green, and other colors as desired, following the trend to greater use of color in housewares, tools, and home appliances. Research also revealed that the plastic housing was lighter in weight and required fewer finishing operations than a comparable metal housing. Stronger than a metal housing, the plastic case will not crack or shatter even if the tool is accidentally dropped in use.

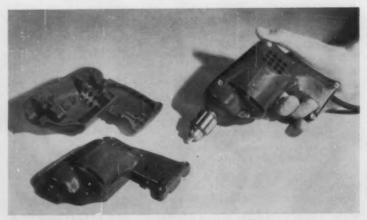
Whereas with a metal drill housing it is necessary to provide a means of grounding to reduce the possibility of short circuits and electric shocks, the plastic case automatically eliminates such hazards because of the inherent dielectric properties of the material, even when the tool is being used in wet weather or under unusual conditions.

From the user's standpoint, another virtue of the plastic case is the fact that, unlike a metal housing, it does not become unduly hot or cold to the touch when exposed to summer sun or winter cold. Regardless of the temperatures to which it is exposed, the housing maintains a fairly uniform temperature which makes it comfortable for the worker to handle. In addition, the plastic housing does not heat up excessively under continued operation of the drill.

The two halves of the housing are molded with ventilation slots and holes, trigger opening, cord passage, assembly holes, and various internal ribs and cavities to fit the working parts of the tool. So functional is the design of the plastic case that all working parts may be exposed by removing five assembly screws.

Molding of the reinforced phenolic parts is handled on a 150-ton overhead plungerequipped compression press, using a two-cavity production mold designed for the plunger transfer type of molding.

Credits: Housing molded by The General Industries Co., Elyria, Ohio, using cotton fabric-filled phenolic material supplied by The Fiberlite Corp., Winona, Minn.



Two-piece housing for hand drill, molded of reinforced phenolic, provides light weight and electrical and thermal insulation

B 88



Clear and clean . . . with Ferro 203!

Now, Ferro 203, a uniquely modified cadmiuminhibitor PVC stabilizer, can help you produce better quality clear vinyl products at low cost.

It gives you high clarity, good heat and light stability, good resistance to water absorption and no odor. If you manufacture convertible window stock, clear garden hose, tubing or films, you should try Ferro 203 to eliminate production problems and improve your product's service life. Write, wire or call collect* today for samples and technical data.



FERRO VINYL STABILIZERS

Ferro Chemical Corporation • Bedford, Ohio

A SUBSIDIARY OF FERRO CORPORATION

In Great Britain and on the continent (except Germany) Ferro Vinyl Stabilizers are manufactured and distributed under license by PURE CHEMICALS LTD., Kirkby Industrial Estate, Liverpool, England.

*Call collect...for samples, technical data or assistance on vinyl formulation or production problems. Call Cleveland, Ohio, BEdford 2-5320, Ferro Technical Service Department and reverse the charges! No obligation, of course!



"Halle-lu-jak!

Cushions Thermosets Against Shock

The muscle-building strength of CLAREMONT COTTON FILLERS gives thermosetting plastics the strength to stand up, resist breakage and withstand shock treatment.

Samples Available Inquiries Invited

CLAREMONT WASTE MFG. CO.

The World's Largest Manufacturer of Plastic Fillers

What Shape's Your Product In? CYLINDRICAL SPHERICAL It Doesn't Matter! ... there's an

DECORATING & MARKING MACHINE

that will print directly on it

- 1, 2 or more colors in perfect register
- automatic or hand feed machines.
- · rapid changeover
- · inexpensive plates
- permanent inks in all colors.

and SAVE YOU MONEY!

OVER 40 STANDARD MODELS to choose from in America's largest and most complete selection

There's an APEX machine to mark or decorate anything and everything. No item is too large or too small . . . no run too long or too short. Apex gives you unlimited flexibility, eliminates label inventory problems, gives you unmatched versatility and relief from production headaches. Get all the facts teday.

Anything that can be printed on paper can be printed on your product . . . AT LOWER COST.





DANIELS

MOULDING PLANT For Plastics & Rubber IN USE ALL OVER THE WORLD

Illustrated are three of Daniels' productions—approved by leading manufacturers at home and abroad. Very finely designed for easy and efficient working, they offer the most up-to-date methods of moulding Plastics & Rubber for innumerable uses.

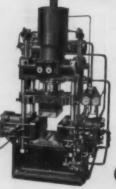
- 1. TABLETTING MACHINE
- COMPRESSION MOULDING PRESS with hydraulic ejection and time cycle control.
- 3. SIDE RAM PRESS



T. H. & J. DANIELS LTD.

STROUD GLOUCESTERSHIRE ENGLAND





Does your **Product Require**

RIGID PLASTIC



- corrugated
- · reinforced
- laminated
- transparent · opaque

High & low impact P.V.C. Sizes to 51" x 108" CORRUGATED

translucent

embossed

For architectural construction, displays and decorative trim

LAMINATED

Including decorative materials like Fi-berglas, wire screen, fabric, paper and many others. Widely used for lampshades

HIGH COMPRESSION

Up to 50" wide and 72" long, of phenolic, silicone or esters

REINFORCED

Built-up sheets of unusual strength and thickness. Up to 3½" thick in polyethylene

PRESS POLISHED

Smooth flaw-free surfaces. Good optical properties when transparent

EMBOSSED

variety of interesting colors and effects

CLARITY

Transparent, translucent and opaque COLORS ON REQUEST

SHEETS and ROLLS IN STOCK

Vinylite acetate polyethylene Plexiglas modified styrene odified styrene butyrate high & low impact P.V.C.

No matter how unusual your specifications may be . . . we meet them precisely. Let us know what your requiremente are.

SCRANTON PLASTIC LAMINATING CORP

3218 PITTSTON AVENUE SCRANTON 6, PENNSYLVANIA

What's happening

(From pp. 83-88)

gist is challenged to find a way to utilize this property.

Saturated acids: The saturated acids are not essential to the functioning of the general-purpose polyester. They are added to modify the properties. Once again, cost seems to be the most important property; consequently phthalic anhydride, the cheapest diacid, finds its way into the typical general-purpose resin. Phthalic is not merely an extender, however. It is an aromatic material, and provides high tolerance for styrene monomer as well as high heat resistance in the final product.

Isophthalic acid is now a contender for a portion of the polyester market. Isophthalic acid bears somewhat the same relation to phthalic anhydride that fumaric acid bears to maleic anhydride. It is slightly more expensive and it is an acid with a mol of water to be removed in esterification. Also, the present product is colored. Against these handicaps, Oronite claims higher reactivity than phthalic anhydride, and Chemical Process Co. states that polyesters with isophthalic acid have higher affinity for fibrous glass and yield better flexural strengths. Isophthalic alkyds are more viscous than their phthalic counterparts, as the chains are more extended. This could be an advantage in the formulation of thixotropic compositions for application to vertical surfaces. Also, it permits greater dilution with cheap sty-

For still higher softening temperatures, the phthalic may be replaced by the complex anhydride - endomethylenetetraphthalic-that Carbide calls Carbic and National Aniline terms Nadic. Higher price puts this material in the specialty category.

Combining high softening temperature with flame resistance is hexachloroendomethylenetetraphthalic acid, shortened to chlorendic acid by Velsicol and HET acid by Hooker. Like Carbic/ Nadic, HET is chemically three rings in one, forming a very substantial, rigid molecule that isn't



The Sentinel Pacemaker, made by pioneers in heat sealing, is a thermal impulse sealing method, designed and engineered to give you these advantages:

- · Light Weight, compactness, low cost
- Requires no skill Insures a safe, FAST and positive
- seal with ease
- Precision automatic controls for correct pressure, heat dwell time
- and COOLING dwell time

 Seals varied thicknesses of Polyethelene, Saran, Pliofilm, MYLAR, Acetate and Vinyl, etc
- No fussy installation. Just plug in
- and start sealing · Economical - draws current only during seconds when heating element is energized
- Simple, rugged, no service troubles Will soon pay for itself in faster production, improved seals

Sizes: 9, 13, 25 and 45 inches sealing area. Hand or foot operated.

area. Hand or foot operated.

For heavy-duty, large dimension jobs, the Sentinel High Speed Band Rotary Sealer — (Continuous Motion) and the Sentinel Jaw Type Sealer. Sentinel equipment meets U. S. Military Specifications.

Write for detailed literature



the first of its kind

a more versatile medium for

pressure sensitive instant adhesion



ANGIER'S DOUDLE-FACE PRESSURE SENSITIVE Transfer Film

Entirely different from conventional double-coated tapes. "Double-Face" is a specially reinforced pressure sensitive mass incorporating the features of conformance, adhesion and aggressive tack provided by many liquid pressure sensitive applications. It is a translucent pressure sensitive mass in film form supported by a double-coated release paper which can be either removed at once for instant bonding or at a later date if used on a consumer product.

- * TRADEMARK OF INTERCHEMICAL CORPORATION
- adaptable to a full variety of porous and non-porous materials.
- conforms to highly irregular surfaces.
- can be slit or die cut with protective release paper in place.
- eliminates drying and coating equipment.
- speeds production reduces waste.

Available in rolls: Widths: 1/4" up to 54" Length: 72 linear yards

3 Types: SOFT MEDIUM FIRM

Write for samples, specifications and prices.

Angier Adhesives

Division of Interchemical Corporation 120 Potter Street Cambridge 42, Mass.

Midwestern Plant Huntington, Indiana

Latest developments in Adhesives for Moneycomb Construction, Vinyl Film Bonding Rubber, Latex and Resin Cements Pressure Sensitive Cements Flocking Cements Laminants and Sealants Tie Coets Resin Emulsions

ANGIER ADHESIVES

© 1986

FRENCH compression and transfer molding presses

For highest quality and most economical plastics molding, investigate French Oil Mill hydraulic presses.

Lower maintenance.

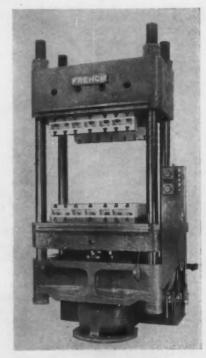
Longer life.

Reduced mold maintenance.

Less scrap losses.

Increased production.

Standard sizes designed to you specifications. Controls to fit your needs—from hand operated to automatic.



300 Ton Compression Molding Press 19½" Ram Diameter 28" to 52" Adjustable Daylight 41" x 31" Pressing Surface

Write for illustrated bulletin.

THE FRENCH OIL MILL MACHINERY (O. INTO GRIENE ST. PIQUE, ONIO

disturbed by heat. But, in addition, HET is so loaded with chlorine that it does not support combustion. Thus translucent partitions containing HET will satisfy the building codes. This development opens up important markets from which the polyesters were formerly barred.

High cost, poor solubility, instability to light, and a tendency to discolor at elevated temperatures are among the drawbacks of this ingredient.

On the other hand, it offers the only method known at present (aside from glass) for achieving translucency and flame resistance simultaneously. Antimony oxide, the low road to flameproofness, gives an opaque sheet. Another important group of saturated dibasic acids are the flexibilizersalmost exclusively adipic acid in this country, although the more costly sebacic acid is apparently used to some extent in Britain. These are the straight chain dibasic fatty acids. The longer the chain, the more toughness and flexibility is imparted to the

Carbon atoms	Acid	Efficacy
4	succinic	least
5	glutaric	
6	adipic	
9	azelaic	
10	sebacic	greates

These materials also help reduce the change in viscosity with temperature, so that there is less likelihood that the resin will "run away" from the glass fiber when heat is applied.

All these acids are more expensive than maleic, fumaric, phthalic. Adipic is by far the lowest priced, consequently the most used. Azelaic acid, obtained by ozonolysis of cheap animal fats or cheaper tall oil, may some day be competitive with adipic in both color and cost. Sebacic, from castor oil, is far too expensive. There is talk of succinic becoming available at the same price as adipic. At this level, polyester makers will not rush to buy it. Isosebacic acid, branched instead of straightchain, probably rates somewhere between adipic and azelaic as a flexibilizer and its price will determine its usage. The total con-

(To page 212)





Increased production: the unit is designed for non-stop operation having dual let-off and take-up stands; runs at 6-42 yards per minute.

Customers claim up to 35% in yardage without loss of width; chrome and engraved rolls are internally cooled.

Superior performence: pressure is infinitely adjustable to suit roll being used; air pneumatic pistons individually controlled.

LIBERTY MACHINE CO. INC.

This Liberty Combined Embossing-Polishing and Lominating unit, for all gauges of vinyl, has on operating face of 62". Handles widths up to 60".

Get complete details by writing Liberty Machine Co., Inc., 275 Fourth Ave., Paterson 4, N. J.



Manufacturers of quality papers specify Du Pont Ti-Punus tilanium dioxide pigment to add brightness and opacity just as makers of quality printing inks specify Du Pont Pigment Colors for fine reproduction. Reprints of this illustration, suitable for framing, are available on request from your Du Pont Pigments salesman.

Du Pont Pigments add beauty...practicality...versatility

NATURE'S COLORS ARE RIVALED BY DU PONT PIGMENTS



The brilliance of a butterfly captured in crock- and bleed-resistant colors

Most of nature's brilliant cated. But, in plastics, the working proper-TOST of nature's brilliant colors can be duplities and processing characteristics of pigment colors are also extremely important. And so is performance. Because Du Pont Pigments offer plastic manufacturers a combination of these properties, they are widely accepted for use in plastic and rubber applications.

Consider Du Pont "Monastral"® Greens and Blues, for example. These pigments offer superior resistance to crocking and migration in all shades. In addition, they are the most lightfast and chemical-resistant of all organic pigments-they also have outstanding resistance to heat. "Watchung" Reds also have outstanding resistance to migration, heat and crocking.

But that's just part of the story. The pigments you use must disperse easily . . . assure you of ease in processing and dependable performance in finished products.

Call on your Du Pont Pigments representative to assist you in your pigmenting problems. Du Pont has an extensive background of technical experience in the plastic and rubber fields. E. I. du Pont de Nemours & Co. (Inc.), Pigments Department, Wilmington 98, Delaware.

These high-quality Du Pont Pigments will give you the colors and properties you require.

Green-Gold

-Durable Organic Yellow

MONASTRAL® Blues and Greens TI-PURE® Titanium Dioxide

"Ramapo" Blues and Greens

Molybdate Oranges

Chrome Yellows

Shading Yellow

Benzidine Yellow

"Watchung" Reds



Frequent checks confirm the high batch-to-batch color uniformity and dispersion characteristics of Du Pont Pigments. Here, a pre-production sample of vinyl sheeting, containing 0.1 % "Monastral" Blue B BT-380-D and 1.0 %"Ti-Pure" titanium dioxide, is compared with a specification color standard. Du Pont "Monastral" Pigments are widely used in many plastics products requiring top resistance to light, heat and migration.



to fine products everywhere

Du Pont Pigments and Deauty...practicality...versatility

sumption of flexibilizing acids in polyesters at this time is small.

Monomers. The reaction of glycols and acids gives an alkyd, a viscous liquid, the molecules of which may contain five, ten, or more unsaturations. It is the function of the monomer to copolymerize with the alkyd, via these unsaturations, thus hardening the resin.

Economy has been the overriding consideration in the selection
of a monomer. Since styrene is
the cheapest monomer which fulfills most of the requirements, it
has been the one most commonly
used. It has always been cheaper
than the alkyd. Now, to avert the
threat of competition from GR-S
rubber producers, the monomer
manufacturers are slashing the
price of styrene by a full four
cents. This is sure to encourage
still further emphasis on styrene
in polyester formulations.

While styrene combines readily with the fumarate groups in the alkyd, it leaves the maleate groups virtually untouched. In this respect styrene is inferior to "slower" monomers such as diallyl phthalate or vinyl acetate, which have other drawbacks.

From copolymerization studies (5, 6)1, it may be deduced that maximum cure in styrene-fumarate systems occurs at the "azeotropic" composition, 43 mol % fumarate ester. This would amount to 53 weight % if the alkyd were propylene glycol fumarate, somewhat more for fumarate-maleate mixtures, and still more for alkyds containing both saturated and unsaturated acids. As the author showed several years ago (7), these "azeotropic" mixtures generally give optimum mechanical properties and translucency. If we stray too far from these ideal proportions, we get a heterogeneous conglomeration of copolymers that tend to be brittle and opaque. Parker and Moffett (1, 4) have demonstrated the effect of composition on properties of polyesters.

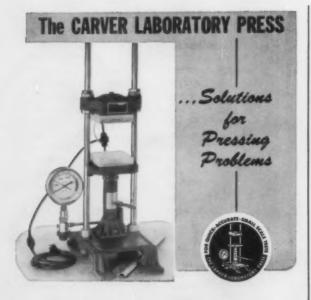
Two new members of the styrene family have possibilities in

¹Numbers in parentheses link to references at end of article, p. 220.

polyesters: Dow's vinyl toluene and American Cyanamid's methyl styrene. They are somewhat less volatile than styrene itself, hence of interest in premix molding.

Methyl methacrylate, too, has been coming down in price, though it's not in the same range as styrene. According to recent work in Scotland, methyl methacrylate would not be suitable by itself with fumarate alkyds. But Rohm and Haas, Interchemical, and also Sherwin-Williams have shown that methyl methacrylate may be a desirable component along with styrene, bringing the refractive index of the polymerized resin closer to that of the glass, and thus improving the transparency. Resistance to erosion is an added benefit.

For the first time, 100% acrylic resins have been used in the laminating industry in conjunction with reinforcing fibers. Reinforcement of acrylic laminates with synthetic fibers, notably Orlon acrylic fiber and Dynel polyester fiber, permits easy post-forming. This, combined with superior



Accurately controlled pressures to 20,000 lbs.; 6-inch gauge mounted on base. Carver Standard Accessories include Electric or Steam Hot Plates, Carver Test Cylinders, Swivel Bearing Plates, Cage Equipment. Available from stock. Write for catalog.

FRED S. CARVER INC. HYDRAULIC EQUIPMENT 3 CHATHAM ROAD, SUMMIT, N. J.

Produce Intricate Molds with ALEXANDER DIE SINKERS

Combining precision performance with rugged construction, this latest model, No. 3A, copies the finest detailsyet handles dies and molds up to 1,000 lbs. It is used for 2 and 3 dimensional work. Versatile in design, it employs ratios from 1.5:1 to 10:1-14 spindle speeds from 475 to 9500 rpm-cutters up to 3/8" in dia. Adjustable spindle can perform both heavy roughing and minute finishing oper-

ations. Also available in smaller sizes 1A and 2A.

Prompt delivery—large stock of spare parts.

Write for catalog on Alexander Die Sinkers. Also engravers, **cutter grinders**, optical measuring equipment, rotary engraving attachments and other accessories.

J. ARTHUR DEAKIN & SON

150-28 Hillside Avenue

Jamaica 37, New Yor



With RADIAL CUTTER New THIN-KERF* Fine Pitch Blades

These new carbide-tipped circular saw blades have been carefully developed to cut smoothly and precisely without edge chipping or cracking . . . eliminate sanding and other finishing operations . . . reduce your material waste by 20% or more. Designed specifically for applications in thermosetting and thermoplastic materials, printed circuitry, expensive woods and veneered plywoods and light gage non-ferrous metals, Radial Cutter THIN-KERF blades are ideal for hand-feed, precision cutting operations and, under certain conditions, for power feed single or gang-cutting operations. Write today for prices and specifications.

RADIAL CUTTER

MANUFACTURING CORPORATION

829 Bond Street, Elizabeth 4, New Jersey SPECIALISTS AND LEADING MANUFACTURER OF CARBIDE-TIPPED SAW BLADES

weatherability, should ensure a bright future for synthetic fiberreinforced acrylics, in the opinion of Du Pont technologists.

The allyl esters were among the earliest raw materials for reinforced plastics, but were pushed aside by the cheaper maleic anhydride alkyds. Now the allyls are coming into their own. Ohio-Apex's solid prepolymer and Barrett's premix molding compound take advantage of diallyl phthalate's non-volatility and good shelf life. The prepolymer is also preshrunk, with approximately 11% contraction remaining. Its good shelf life is an example of a handicap turned into an asset: DAP is stable because it is slow to polymerize. A new development is Ohio-Apex's diallyl isofaster-curing than phthalate. DAP itself. The allyl groups do not polymerize completely (8). Consequently, a triallyl ester will give better cures than a diallyl ester. Naugatuck researchers (4) got improved heat resistance from triallyl aconitate, triallyl carballylate, and above all TAC, American Cyanamid's triallyl cyanurate. Properly cured TAC polyesters can resist temperatures as high as 500° F. At present prices, however, TAC will be used for only the most critical applica-

Other commercial developments: The H. H. Robertson Co. has brought out two new resins. Stypol 12 is a flexible resin to be used in conjunction with rigid resins in order to eliminate cracking in resin-rich areas. Stypol 4051 is a semi-rigid resin, the use of which eliminates the need for mixing flexible and rigid

Interchemical reports eight new resins, utilizing methyl methacrylate, diallyl phthalate, and vinyl toluene as well as older materials. Atlas Powder's Atlac 382 is said to be outstanding in chemical resistance. In Spencer-Kellogg's Keltrols 1001 and 1013, vinyl toluene is utilized as the monomer. Wyandotte expects to benefit from its basic position in glycols, as well as its nearness to the automobile manufacturers, when its polyesters come on stream. Pittsburgh Plate Glass offers Selectron 5119, a singlecatalyst-system, room-temperature curing material. N-vinyl pyrrolidone, proposed by General Aniline as a monomer, is said to give marked increases in flexural strength when used in 5 to 15% concentration in place of some of the styrene. Among Celanese developments is a new low-cost material, composition undisclosed.

Research developments. Gamma radiation can be used instead of catalysts to cure polyesters. Dr. T. D. Callinan, of the Naval Research Laboratory, has discovered that the rays from cobalt-60 will initiate polymerization in a variety of commercial polyesters. While he has been concerned particularly with the nonreinforced embedding of electrical components, it is apparent that the method offers great promise for the curing of reinforced plastics

Perhaps the most important goals in polyester development are improved heat resistance at

NEW! DME STANDARD COMPRESSION MOLD BASES

"Tailor-Made" FOR STOKES MODELS 800 & 741 PRESSES

HERE'S ADDED SAVINGS AND TROUBLE-FREE PERFORMANCE FOR COMPRESSION MOLDERS..!

Available in D-M-E No. 1 or No. 2 Steel. Cavity plates ground Flat and Square. Complete range of Cavity Plate thicknesses. Ready to install cavities or inserts. Leader pins and bushings-Precision Ground. Ejector bars drilled to suit K-O Rods.



D-M-E 611-C (6" x 10%") For Stokes Model 800 Press



D-M-E 1315-C (13" x 15") For Stokes Model 741 Press

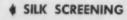
Write TODAY for Complete Prices and Specifications..!

DETROIT MOLD ENGINEERING CO.

6686 E. McNichols Road — Detroit 12, Michigan Branches in Hillside, N.J., Chicago, Ill., Cleveland, O. & Los Angeles, Calif.

PERMANENT
CONTAINER
DECORATION...

expertly executed, enhances the eye-appeal of your products at the right point—THE POINT OF SALE.



OFFSET PRINTING

HOT STAMPING

Electronic QUALITY CONTROL insures SUPERIOR QUALITY on small runs, large runs or re-runs.

Pen a post card for samples giving you a true eye-view of what PERMANENT'S Know-How and Can-Do achieved for other progressive manufacturers.

PERMANENT 49 ACKERMAN STREET LABEL CORPORATION Bloomfield N. J. - EDISON 8-6200

moderate cost and improved adhesion to glass. The heat problem needs thorough researching, utilizing all accumulated know-how to effect higher cure densities. The adhesion problem, as well as the related shrinkage problem, seems to call for a radically new approach.

Epoxies

The epoxies are the bright new stars in the resin galaxy. Excelling in adhesion to metals and chemical resistance, the solid resins have achieved remarkable success in industrial coatings. The liquid resins, developed later, are finding wide use in metal-forming tools, inspection fixtures, adhesives, repair kits, and potting and encapsulating. They have displaced the polyesters in plastics tooling applications where dimensional stability is important, and in hot water pipe, where the resin-glass bond must resist thermal-mechanical shock. They are even preferred over the polyesters for patching boats and cementing tanks made from poly-

Propertywise, the epoxies are outstanding. They are 100% reactive, can be formulated to any desired viscosity, blended with a variety of reinforcing agents and fillers, and cured at atmospheric pressure without application of external heat and without evolution of gas. Shrinkage is low; adhesion is high; electrical, mechanical, and chemical properties are good.

The typical epoxy for reinforced plastics is made in two stages. First, bisphenol A is reacted with epichlorohydrin to give an amber-colored liquid resin; then this is hardened with an amine or anhydride, usually the former. These three ingredients-bisphenol, epichlorohydrin, and amine-account for both the virtues and the shortcomings of the epoxies. The bisphenol contributes the good resistance to heat, moisture, and alkalies that is characteristic of aromatic compounds. But like phenols everywhere, it gives colored products. The epichlorohydrin supplies the epoxide groups that get credit for the high reactivity of the resin intermediate. But "epi" is a waste-





Precision...In Miniature! High bond strength and excellent electrical properties of Araldite Epoxy Resins make possible the design and production of this chatter-less stator. Formulator: Rubber & Asbestos Corp.



Ciba Araldite Epoxy Resins come with the assurance that they have met not only our rigid PRODUCTION qualify control standards but the specific APPLICATIONAL requirements of the user as well.

Ciba produces basic resins only, to be formulate

CIBA

Whether your use of Araldite Epoxy Resins would be for coating, tooling, electrical, adhesive or laminating applications, formulations based on Araldite Epoxy Resins can meet your requirements exactly. The excellent adhesive,

mechanical and chemical properties of Araldite Epoxy Resins, plus their versatility, make them "a natural" to promote design improvements and save time and money on the production line. Here are two of the many instances where Araldite Epoxy formulations provided the right answer to large and small scale design problems.

The Technical Services of Ciba's Plastics Division are the finest in their field. For full information on how Ciba Araldite Epoxies lead to product development and production improvements, write...

CIBA COMPANY Dept. 2, Kimberton, P.	INC., Plastics Division ennsylvania	MP-2	
Please send me full	Information on CIBA Epoxy Resins for	☐ General	
☐ Tooling	Structural Laminates	☐ Surface Coatings	
☐ Electrical	☐ HI-Strength Adhesives	☐ Plastic Body Solders	
NAME			
COMPANY	TITLE		
ADDRESS.			
CITYSTAT		E	

Dries as it loads

D & W HOPPER DRYER
and NEW combination Automatic
JET HOPPER LOADER



for all EXTRUSION and INJECTION machines...

- Dries and preheats material at less cost than with conventional drying ovens.
- More production because of properly controlled material conditioning—fewer rejects.
- Compact size saves space. Installed in minutes on any standard extrusion or injection machine.
- Dries and preheats as it loads. Requires no compressed air. Thousands proved in use.



Typical installations



Available for any size installation, large or small.

Write today for full information.



18208 W. McNichols - Detroit 19, Michigan - KEnwood 1-8877

COLORING IN THERMOPLASTICS BY REED

guarantees a "bull's-eye" solution to any problem in thermoplastic coloring.

Reasons: Our large staff of skilled chemists. Our laboratory which is the most modern in the thermoplastic industry. Our speedy sampling service. Our fast deliveries on any size run. Our ability to create or match any color or effect.

Bring us your toughest coloring problem now.

REED PLASTICS CORPORATION
116 Gold Street • Worcester, Mass.

MAYFLOWER METHODS INCREASE PRODUCTION



Quite frequently our technicians are called upon by fabricators to suggest means of perfecting and speeding up difficult plastic sealing operations. By intense application—by designing and building special equipment—we are most always able to raise quality as well as the rate of production.

4 POSTED

A standard Mayflower press has 18"x30" flat bed; powered by Mayflower 3½kw. generator. Accurate and highly productive in a widely diversified application of tear sealing.





ayflower ELECTRONIC DEVICES

Only Manufacturer of both Bor and Rotary Electronic Heat Sealers HUbbard 9-9400

20 Industrial Avenue

Little Ferry, N. J.



134 YEARS
EXPERIENCE
IN FINE TOOL
& MOLD WORK



There's no short-cut to the skill and experience our research, design and engineering departments bring to every molded plastic job. Since 1812, "Waterbury" has developed a tradition of fine craftsmanship that can't be matched anywhere.

Call on our know-how to assist in product development on your molded plastic parts.

behind each Waterbury Molded Plastic Part!

MOLDING FACILITIES

Compression up to 700 tons capacity • Injection up to 40 ounces

Transfer • High Speed Plunger • Low Pressure Fiberglass

Automatic Injection and Compression • Assembly

Engineering and Designing Assistance

WATERBURY
COMPANIES, INC.
WATERBURY, CONNECTICUT

SALES OFFICES

New York 17, N. Y. Chicago 6, III. Detroit 7, Mich. Boston 11, Mass. Cleveland 13, Ohio Rochester 5, N. Y. Gainesville, Fla.

ful reactant. According to theory, chlorine amounting to some 40% of the molecule is lost when it is combined with the bisphenol. In practice, losses are much higher. The high cost of "epi," both utilized and wasted, is reflected in the premium price of the resin. Finally, there is the hardening agent. For reinforced plastics, particularly in large layups, it is often desirable to cure the resin without application of external heat. The best hardeners for this purpose are the aliphatic amines. But these are skin sensitizers, and repeated contact may cause chronic dermatitis.

New types of epoxy compounds may provide the long range answer to problems of color and cost. Many years ago, chemists at the Eastern Regional Research Laboratory showed that unsaturated materials such as vegetable oils could be converted to epoxies by the action of peroxy compounds. Becco and Du Pont, producers of hydrogen peroxida, have been fostering the use of these materials as vinyl plasticizers. Now,

Carbide and Carbon has found a cheap method of carrying on these reactions. The Carbide process uses the same peracetic acid that is required in the other methods; but they make it, and then make epoxies from it, as in between steps in the manufacture of acetic acid from acetaldehyde. Nothing is wasted. In the language of the luxury car dealer, the high initial cost of the peracetic acid is offset by the high trade-in value.

So far. Carbide has made some four hundred epoxies by this byproduct method. Some already show promise. Styrene oxide is a reactive diluent, and EP-201 is a di-epoxide which may itself be cured. Perhaps the most fascinating of these materials, in its sheer simplicity and concentrated power, is butadiene dioxide. This is the smallest possible molecule containing two epoxide groups. It is a thin, water-white liquid that boils in the same range as styrene monomer. Hardened with amines or anhydrides, it is capable of giving a high density of crosslinks. If the price can be slashed to less than \$1/lb., conventional epoxies will almost surely suffer.

While Carbide's chemical division has been busy making new epoxies, its plastics division. Bakelite, has provided the most hopeful present answer to the problem of dermatitis. The ethanolamines, it finds, are less irritating than the unmodified amines. Shell's new Curing Agent T is also a hydroxy-substituted, low-irritation-potential polyamide.

Apart from the toxicity problem, type and proportion of hardening agent are critical to the properties of reinforced epoxies.

Epoxy resins are available in both solid and liquid form, in a variety of melting points and viscosities. The resins most used with reinforcing agents are liquids of 10,000 cp. or higher viscosity, typified by Shell's Epon 828, Bakelite's ERL-2774, Ciba's Araldite 6010, Jones-Dabney's Epi-Rez 510. These are not pure compounds but mixtures containing, on the average, slightly less than two epoxide groups per molecule. In this respect the epoxies differ

H OBBS

for RIGIDIZED PLASTIC SLITTING
AND CHOPPING



PRODUCTION CUTTER
in operation in large plastics processing plant



at work in asbestos fibre plant

AUTOMATIC SLITTER, CHOPPER AND CONVEYOR



manufacture of folding doors for nationally known producer

AUTOMATIC CHOPPER AND CONVEYOR



production of loose leaf binders in well known plant

AUTOMATIC CHOPPER

Hobbs engineers equipment such as shown here for unwinding, grinding, slitting, chopping, conveying of paper, press board, leatherettes, acetates, coated fabrics and similar materials...for handling infinitely variable widths. Ask for the booklet — Hobbs Engineered Cutting.

See us at the Packaging
Machinery Show, Booth No. 308

OBBS MANUFACTURING CO.
25B Salisbury St., Worcester 5, Mass. (Ho

Representatives in Irvington, N. J.; Chicago, III.; Cleveland, Ohio; Greenville, S. C.; Taronto, Ont.

WINDERS
DIE PRESSES
SHEARS
(Hand & Automatic
SLITTERS
CORNER CUTTERS



DESIGNED AND ENGINEERED TO BE AMERICA'S No. 1 BUFFING LATHE



1 to 7½ H.P. Ball-Bearing V-Belt Drive. Pre-determined speed set at Factory or to your specifications. Buffing Wheels and Compounds available for every Industry... Special Compounds recommended for Special Applications.

Plastic Fabricating Equipment, Tumbling Machines and Compounds

for any of your Buffing Problems, Write Dept. AP for Cost-Saving Solution . . . and Better Buffing.

H. W. KRAMER CO.

120-30 JAMAICA AVENUE RICHMOND HILL 18, N. Y.

HOT
STAMPING
PRESS

FOR-

General Purpose Work May be easily tooled for SPECIAL jobs.

For example—

This application requiring INSIDE and OUTSIDE imprinting was done at one stroke by the ACROLEAF color process

ACCOLCAF

Write for descriptive literature and prices. Send product or part for sample marking.

THE ACROMARK COMPANY

5-15 MORRELL ST., ELIZABETH, NEW JERSEY

"The Original Marking Specialists"

from the unsaturated alkyds, which usually have several polymerizable groups in each molecule.

Because of their deficiency of functional groups, it is more difficult to give the epoxies the kind of thoroughly cross-linked structure that results in high heat-distortion values. Consequently the epoxies generally have not performed as well at elevated temperatures as might be expected from the aromatic structure of the bisphenol. Cure is far more critical in epoxies than in polyesters. Properties will be affected by curing cycle as well as type and amount of hardener.

Several varieties of hardeners are available. Primary and secondary aliphatic amines, typified by DETA (diethylene triamine), give a fast cure at ambient temperature, with no heat added except that which comes from the exotherm during cure. (The exotherm, incidentally, is milder than that of polymerizing polyesters.) Because of their rapid action, these aliphatic amines make for short pot life.

To increase the useful life of the epoxy-hardener mixture, an aromatic primary amine or an acid anhydride should be used. Metaphenylene diamine methylene dianiline are typical aromatic primary amines, while phthalic, HET, and pyromellitic are among the anhydrides. Both types require elevated cure temperatures, and both can give higher heat distortion temperatures. In addition, HET provides flame resistance, just as it does in the polyesters. General Electric is actively working on flameresistant epoxies for motor in-

Another interesting G-E development is an epoxy resin based on sulfonamides instead of bisphenols. Among new developments at Shell are a system based solely on epoxies which gives unusually high heat resistance, and a series of epoxy-rubber blends with good impact properties. For aircraft applications in which strength at high temperatures is critical, the Forest Products Laboratory has developed blends of epoxy and

phenolic resins in varnish form. Longer-lasting strength at elevated temperatures is achieved with a new synthetic resin-based adhesive developed by Rubber and Asbestos Corp. Furnished as a glass-reinforced bonding film, it retains 80% of its original strength after 200 hr. exposure at 45° F.

Bakelite's ERL-3001 is a modified epoxy designed to give laminates of superior toughness for electrical uses. The cure is catalyzed with 0.5% alpha methyl benzyldimethylamine.

In addition to the epoxy-phenolics, two other epoxy alloys have survived a ruthless elimination contest. The Versamids, made by General Mills, and the liquid polysulfide rubbers of Thiokol are employed to give greater flexibility and higher peel strength. The Versamids have a built-in curing agent, and hence must be used in just the right proportion for optimum properties.

Control of the cure, then, is the common denominator for progress in the three major resins for reinforced plastics. Further re-



FROM EVERY VIEWPOINT: IT'S EASY TO SEE THE ADVANTAGES BUILT IN

a Perfect Mold

This means that the mold is made with complete accuracy right to the smallest detail, and reproducing the features that win the approval of the most critical eye.

The castings from molds made in our toolroom prove we have matched the pace set by your engineers. They please because they are perfect molds, as perfect as modern skills in a progressive organization can make them.

The phone at your elbow is our farthest distance from you.

RICHARD O. SCHULZ CO

ELMWOOD PARK

ILLINOIS

DIECASTING DIES
PLASTIC INJECTION AND COMPRESSION MOLDS

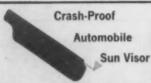


FAMOUS FIRSTS

...and all produced from PETERSON ELECTRONIC SEALING DIES

Hammond
World Globe
(inflatable)







Experienced fabricators of vinyl know that trouble-free operation and superior production demand the best in DIES...DIES engineered and made to Peterson's exacting quality standards.

If you now plan new production let us show you how we can work with your engineers... or take over full responsibility for design and development of the electronic heat sealing DIES you need.

Designers, Engineers & Manufacturers of ELECTRONIC DIES and DEVICES A. W. PETERSON & SONS DIE COMPANY, INC. 131 Prince Street • New York, N. Y.

search will benefit both manufacturer and user of these versatile materials.

Acknowledgment

The author is greatly indebted to Harold Day and Don Estey of American Cynamid, E. K. Stigger of Atlas, Clayton Myers and Dr. Leon Shechter of Bakelite, Frank Backer and Dr. Richard B. Greene of Barrett, Dr. Richard Davies and Thomas Welsh of Celanese, Dr. I. M. Abrams of Chemical Process, Dr. M. Cohen of General Electric, Dr. P. Robitschek of Hooker, Sam Moore of Interchemical, Bert S. Taylor of Ohio-Apex. E. H. Haux of Pittsburgh Plate Glass, William Wirsch of Rohm and Haas, Fred G. Singelton of H. H. Robertson, Jerome Been of Rubber and Asbestos. F. W. Swackhamer of Shell Chemical. Dan K. Farstad of Spencer Kellogg, Sanford Davis of Wyandotte, and Dr. T. D. Callinan of U.S. Naval Research Lab.

References

General:

- 1. Schildknecht, C. E., editor, "Polymer Processes." 1956. New York: Interscience Publishers. Phenolics:
- 2. Martin, R. W., "The Chemistry of Phenolic Resins." 1956. New York: John Wiley & Sons. Polyesters:
- 3. Bjorksten, J., Tovey, H., Harker, B., and Henning, J., "Polyesters and Their Applications." 1956. New York: Reinhold Publishing Corp.
- 4. Unsaturated Resins Symposium, Ind. Eng. Chem. 46, 1613 (1954).

Also, on copolymerization:

- 5. Mayo, F. R. and Walling, C., "Copolymerization," Chemical Reviews 46, 191 (1950).
- 6. Alfrey, T., Bohrer, J. J., and Mark, H., "Copolymerization." 1952. New York: Interscience.
- 7. Skeist, I., J. Am. Chem. Soc. 68, 1781 (1946).
- 8. Eirich, F. R., Starkweather, A., and Adicoff, A., Ind. Eng. Chem. 47, 302 and 2455 (1955). Epoxy resins:

9. S.P.E. Symposium, Cleveland, Feb. 1956; Los Angeles, Nov. 1956.

Amer. Chem. Soc., Symposium, Atlantic City, Sept. 1956.—End

STEARATE

HEADQUARTERS



There are ample and compelling reasons why Metasap, the nation's largest producer of stearates, is known from coast to coast as "Stearate Headquarters". The unvarying uniformity and extreme purity of Metasap Stearates are recognized wherever stearates are used. If you have special needs—Metasap is equipped to formulate custom-made stearates to meet them.

Our skill with stearates is complemented by our nation-wide distribution facilities. Whatever your needs, you'll fill them best by submitting them to "Stearate Headquarters"—Metasap.

Stearates of:

Aluminum Lithium Barium Magnesium Calcium Zinc Lead

Also:

Aluminum Palmitate Zinc Palmitate Aluminum Octoate



Harrison, N. J. Chicago, III. • Boston, Mass. Cedartown, Ga. • Richmond, Calif. London, Canada

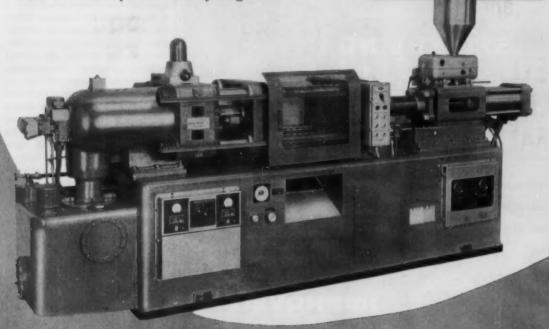
NOPCO Subsidiary

The Cleanest Stearates Made!

AUTOMATION

This is the age of automation and Negri Bossi automatic machines lead the way. Negri Bossi equipment features special safety devices and models with fully automatic cycling.

R. 12 F.A. Fully automatic injection press-capacity 4 to 6 oz.-fast operating cycles (8 shots a minute)





VUOTOPLAST Vacuum Forming Machines



EXTRUDERS and accessory equipment

Sole distributors:

Write for further information

U.S.A.—Acme Machinery & Manufacturing Co., Inc. 102 Grove Street, Worcester, Mass. Phone: PLeasant 7-7747

New York Office: 2315 Broadway Phone: SUsquehanna 7-1705 Canada—Plastics Equipment & Accessories 1362 Jean Talon Est. Montreal 35, P.Q. Phone: CRescent 4-8274

NB&C

NEGRI BOSSI & CO., MILAND (ITALY)

Corso Magenta, 44

Cable address: Gianimar



Salt bowl for cattle

(From p. 89)

yellow which is adhered to the top of the bowl with an epoxy cement. For installation, a set of holes to accommodate the two mounting screws are molded into the back of the bowl. For those installations where the bowl is to be attached to a pipe or railing (it can also be screwed directly onto the wall), a small "saddle" or mounting block (see photo) molded of alkyd resin-fibrous glass premix is supplied.

The selection of reinforced melamine for the job followed a full year of field testing by the Morton Salt Co., in cooperation with the molder, The Richardson Co., and was based on six of the material's outstanding advantages:

- 1) Resistance to crazing or cracking under the stresses that might be set up by the cow leaning its full weight against the bowl.
 - 2) Resistance to corrosion.
- Outdoor weathering qualities (bowls are used in outdoor feeding stations, as well as in the barn).
 - 4) Ease of cleaning.
- Color matching potential (the blue and yellow in the bowl match the company's colors) and color fastness.
- 6) Light weight (the bowl weighs less than 2 pounds).

Considering the fact that the feeding habits of cattle will necessitate the use of several bowls both indoors and out doors, the first year's production of the bowls is expected to hit about 1/4 million units. Of even more significance to the plastics industry is the fact that the salt bowl represents another step forward in the efforts of the industry to broaden the base of applications for reinforced melamine-a base which is expected to include by the end of 1957 such largevolume applications as business machine housings and portable TV cabinets.

Credits: Permelite reinforced melamine supplied by Fiberite Corp., Melamine Plastics Div., Winona, Minn.; molding by The Richardson Co., Melrose Park, Ill.

Veils and overlays

(From pp. 95-97)

serving trays. Use of a glass veil makes it virtually impossible for the coarse glass strands to break through the surface.

Fire resistance

Still in the experimental stage is the use of a veil to impart fire resistance to normally flammable reinforced products. Carbide and Carbon Co.'s vinyl-acrylic fiber Dynel is self-extinguishing. The company's test data indicates that Dynel should find widespread usage in products calling for fire resistance. Until now it has been necessary to use specialty polyester resins in order to be able to produce products that were fire-resistant.

In the consumer field, decorative veils answer the industry's need for improved appearance in reinforced plastics products. Silk screened paper, cotton, rayon, and glass are being tested. Use of decorated veils provides the product with a smooth decorated appearance and hides the random glass fiber patterns very effectively. In addition, decorated veils give producers a wide choice of colors. Until now, producers have found that they were restricted to coloring the product with pigmented resins.

Ability to decorate reinforced plastics is expected to increase the sales of products in their present markets as well as open up completely new markets hitherto closed to reinforced plastics because of appearance. Screens, bathroom and kitchen panels, dishware, office partitions, decorated windows, and office and room dividers are but a few of the many suggested applications for them.

Credits: The following companies provided information used in preparing this article: American Felt Co., Glenville, Conn.; Carbide and Carbon Chemicals Co., New York, N. Y.; E. I. du Pont de Nemours & Co., Inc., Wilmington, Del.; The Kendall Co., Walpole, Mass.; L.O.F. Glass Fibers Co., Toledo, Ohio; Molded Fiber Glass Body Co., Ashtabula, Ohio; Owens-Corning Fiberglass Corp., Toledo, Ohio; Structurlite Plastics Coup., Hebron, Ohio; Troy Blanket Mills, Troy, N. H.









Nothing!

Performance: SUPERIOR

Price:

Actual Size

SAVINGS effected by converting from bronze to Nylon paid for the mold of this spherical bushing.

Formerly it was a 5-step machining operation at a unit cost of .575 cents. It is now made in one operation. In 1000 lots each part costs .255 cents. Savings on the initial order paid for the mold.

LET US QUOTE ON YOUR SHORT-RUN PLASTIC MOLDINGS.
WE WILL SUBMIT QUOTATIONS WITHOUT OBLIGATION.

DAYTON ROGERS

Manufacturing Company

MINNEAPOLIS, 7K, MINNESOTA



Here in Greater Miami Personnel Managers have few headaches

Personnel problems practically vanish here, for hard-to-find employees, like engineers...skilled technicians... become readily available when you advertise openings in a plant in Greater Miami — America's No. 1 area for personnel recruitment. You can select the best men from among many applicants for every part of your plant...resulting in top quality, low-cost production.

The 1700 manufacturers here know that this fact means greater profits—that's why "There's a Hard Dollar Reason for locating your plant in Greater Miami."—Send, on your letter-head, for 30-page Fact File—complete statistical area analysis.



GREATER MIAMI INDUSTRIAL DIVISION

Dade County Advertising Dept. 194 • 141 N.E. 3rd Ave. • Miami, Flg. • Phone FR 1-3611

Quality controlled deeglas in this all-plastic U.D. milk float



Chopped strand mat and deeformat in standard and rooflighting grades. Glass rovings.



Glass Yarns & Deeside Fabrics Ltd. 44-46 Kingsway, London, W.C.2 Telephone Chancery 7343 and 8257 MIB 8201 This all-plastic milk float, manufactured by Mickloover Transport Ltd. for United Dairies, employs deeglas chopped strand mat as its sole reinforcing material.

All deeglas products, chopped strand mat, glass rovings and deeformat, are produced under a quality control system based on the requirements of BS.600 and BS.600R. This ensures the consistency so essential for perfect mouldings.



Heat seals

(From pp. 106-107)

low polyethylene pins, which are made with slotted sides, stand 15 in. high and weigh only 5 oz. each, eliminating the danger and noise of flying wooden pins. This portable bowling game has proved to be ideal for use in schools, clubs, hospitals and similar locations. Requiring no special alleys or other costly equipment, the bowling game set includes a 2-lb. bowling ball and a portable backstop which also serves another purpose: a convenient carrying case for the pins and ball.

The speed and simplicity of the heat-sealing process are indicated in some of the accompanying illustrations. One of the photos shows the sealing of Pee Gee Bee golf balls on a small rotary machine. Here, one operator places the two mating halves of each ball together and feeds it into the machine, which automatically fuses the parts and ejects the finished ball. Following inspection, the balls are ready for shipment. A basically similar method is employed in heat sealing the other hollow polyethylene items illustrated.

The largest machine built thus far to apply this sealing technique has been used to join the two halves of 1-gal. battery acid containers molded of polyethylene. This machine employs air to hold the parts in the chuck and is so designed that either vacuum or pressure can be applied in the sealing operation. After the seal has been made, the machine automatically loosens the bead of plastic material which is formed at the parting line as the halves are joined. The bead is easily brushed away as the sealed item is removed from the chuck.

Although all of the Cosomatic heat-sealing machines operate on the same basic principle, it is reported that each unit must be designed to handle the particular parts involved. Accordingly, the size of the parts to be sealed and the quantities desired determine the final construction of each machine. Both the machine and the sealing process are patented by the company.—End

Where ACCURACY in TEMPERATURE COUNTS!



Three years of field experience and hundreds in use prove that the exclusive Design of this instrument gives split-degree accuracy ... far finer than any other. Model JS gives truly stepless control. No relays. It immediately modulates input to demand, feeding more or less power to meet and maintain pre-set control point.

If accuracy is important to you, don't be satisfied with less!

for Practical Accuracy and Economy



Model JP

Gardsman

PROPORTIONING CONTROLLER

After heating to the proportioning band (1% of scale range) this instrument anticipates temperature change, automatically controls input proportionately. Reliable, modestly priced, proved in wide use.

Write for data on complete line of pyrometric controllers and indicators—including On-Off. High Limit, Program and Multi-Switch Position—plus Thermocouples and Accessories for any controller.

ASK YOUR DEALER

WEST Instrument

*WARRANTY . . . covers both materials and workmanship and provides for repair or replacement during a full WEST Instrument CORPORATION
4359 W. Montrose Ave.—Chicage 41

Send me Free Bulletins on JS [] JP []

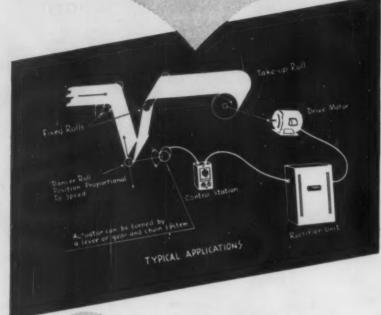
Other

Name

Addres

Zone Sta

Surveyond Automatic Take-Up



HERE'S IT WORKS
... for Textile and
Plastics Processing

A small tension change positions the actuator shaft so as to call for motor speed change to restore preset tension. Thus a constant linear feet per minute windup may be achieved even though the radius of takeup roll increases with each turn to otherwise increase linear speed versus radius build-up. Speed is now made proportional to position of dancer roll and tension is held essentially constant, as is the linear rate of material travel.

These and other models of electronic motor speed control systems available from 1/50th to 2 horsepower.

WRITE

Servospeed
4 Godwin Ave. Paterson, N. J.

Four hectic months

(From pp. 104-105)

vacuum bags were devised. Obviously, a leak in the pressure diaphragm would have been just about fatal. For curing of the completed assemblies, it was necessary to design and construct a pie-shaped oven 10,000 sq. ft. in area.

The assembly fixture was based upon the use of 6-in. steel pipe, cut and welded to the tolerances previously mentioned. The steel was formed into a semicircle over 30-ft. in diameter, with necessary pads, drilling hole locators, etc., welded to the structure.

Transportation problems

Since Lockheed's plant is located in Burbank, and Zenith's in Gardena, Calif., a distance of some 30 or 40 miles, it was obviously impossible to transport the radome after assembly. Therefore, it was necessary to complete all assembly operations, then to disassemble the part and ship it by motor transport. The logistics of the move were complex, too, as anyone who has braved Los Angeles traffic will readily understand.

Largest available flat-bed trucks were secured, routing was carefully determined in cooperation with the police traffic authorities, and arrangements were made with the telephone and power companies for necessary movement of overhead cables. Routes involving underpasses were sedulously avoided.

Specs met

Assembly and installation of the radome was completed without incident. Prior to installation, of course, a full series of physical tests was applied to the assembled part.

All specification requirements were satisfied.

Currently, operational tests are being conducted to determine the future requirements for this type of equipment.

Should it ultimately be decided that production in quantity is indicated, the knowledge and experience gained in producing the prototype will stand all concerned in good stead.—End

*WARRANTY... covers both materials and workmanship and provides for repair or replacement during a full

Address

one State

Polyethylene on wire

(From pp. 100-103)

was hampered somewhat because of the high pressures necessary during manufacture. Nevertheless, this barrier was overcome to establish polyethylene as a leader in the plastics industry. With the advent of the so-called low-pressure processes, materials makers will be able to offer industry a number of new polymers possessing substantial improvement in some of the properties that have always been desired by the wire and cable manufacturers.

A comparison of properties suggests that these new polymers should not supplant presently available polymers in the majority of applications, but rather will result in an expanded use of all polyethylene. Table I, p. 101, presents a comparison of several of the more important physical properties of low- and high-pressure-processed polymers that have been evaluated.

Low-pressure polymers

The low-pressure polymer is about 4 times as stiff as the high-pressure polymer at room temperature, although the factor diminishes to 1.5 at sub-zero temperatures. On the other end of the scale (see Table II, p. 101), the high-pressure polymer has almost no stiffness at 90° C. while the low-pressure polymer maintains appreciable stiffness at 100° C. The yield strengths of the two materials present a similar picture, which is shown in Table III, p. 102.

Low-pressure polymer has a much lower coefficient of volumetric expansion over the useful operation range for wire and cable applications. This means that in applications where temperature cycling and subsequent expansion and contraction are encountered, the low-pressure polymer gives less difficulty than was previously thought possible with polyethylene.

The low-pressure processes can also produce a polymer which deforms to a much lesser degree at equivalent temperatures, retains strength and stiffness at higher temperature, and expands to a lesser degree than previously





Dryer

GREAT AIDS
IN HANDLING
THERMOPLASTIC
MATERIAL

WHITLOCK

WHITLOCK AUTOMATIC HOPPER DRYER

Dries the material faster and more effectively, holding to a predetermined temperature. Proved successful on nylon, acrylic, butyrate—also on other materials where surface moisture is a problem.

WHITLOCK AUTOMATIC HOPPER LOADER

Transfers materials automatically from any container at floor level to hopper. Keeps materials at a constant level in the hopper, insuring a uniform supply to the heating cylinder.

Write for Literature

C. H. WHITLOCK ASSOCIATES 21651 COOLIDGE HIGHWAY

OAK PARK 37, MICH.



Hopper Loader

NASH

No. 116 ROTARY EDGER



Removes FLASH FASTER from Melamine Dinner Ware

4 high-speed abrasive buffing belt units, universally adjustable, mounted around the turntable with six spindles, do the job of flash removal from plas-

tic dinnerware with this NASH 116 Rotary Edger.

No harsh cutting action or scratch lines. Edges polished by final buffing belt. * Perfect Finish —

★ 12 to 36 Pieces Per Minute —

* 3" to 11" Dia. Mouldings —

★ Fast, Automatic, Accurate —



Engineering Details and Price Data Sent Promptly Upon Request

J. M. NASH Company

2370 N. 30th Street • Milwaukee 10, Wisconsin

Only Limited Supply Left

MISSOURI

offers you **FREE**this Big 170-Page
Market Facts Book



"Available Industrial Tracts in Missouri" is the most complete digest of Missouri's "Tailor-Made" industrial opportunities ever offered. Includes air photos of available industrial locations. . with complete information on power, water, transportation, topography, business, labor and markets of 36 progressive Missouri cities and towns.

While supply lasts, your confidential copy will be sent free in a plain envelope, if you wish. Here's just another example of the "Show Me" state's ability to help you find the ideal spot for relocation of your business in an efficient, one-level plant.

New 110 Misseuri communities have organized industrial corporations to help "Tailor-Make" a modern plant to your plans . . . with over \$15,000,000 in funds to assist in financing. For information, write—or

PHONE COLLECT Jefferson City 6-7185

Remember — Missouri doesn't just send you literature. Missouri engineers go with you on your own confidential exploration tour.

Missouri Division of Resources & Development Richard Kinne, Industrial Director		
Dept. 8793 Jefferson City, Mo. Please send my copy of "Available In- dustrial Tracts in Missouri." This obli- gates me in no way.		
gates me in no way.		
gates me in no way.		

reprints

to work!

Reprints of articles, features and news items that appear in Modern Plastics are often surprisingly inexpensive when ordered in quantity. Many companies make it a practice to have stories which have a bearing on their business reprinted for distribution to their own personnel, customers, prospects, stockholders or to other interested groups.

Whenever you see editorial matter of this type in Modern Plastics magazine or the Encyclopedia issue which you can use in reprint form, in quantities of 100 copies or more, write and quotations will be furnished promptly.

INDUSTRIAL MAGAZINE SERVICE

An affiliate of Breskin Publications 575 Madison Avenue, New York 22, N. Y.



Security of supply is a vital consideration in selecting a source, or sources, for wood flour. One reason is the combustible nature of wood flour during milling.

Wilner has two wood flour plants - completely separated completely redesigned and rebuilt in 1951 — each plant safety engineered from the ground up.

In addition, the Wilner Company controls its own raw materials and its transportation, with elaborate rail facilities and its own fleet of trailer vans, to assure dependable deliveries under any conditions.

Typical Analysis 60 Mesh Wood Flour

Thru	On	%
	60	0
	80	2
140		76.8

Uses of Wood Flour

USES OF WOOD FIGURE
Wood flour is a filler and extender, adding strength, bulk, lightness and impact resistance to ether mere certly materials, such as plastics, lineleum, roofing felt, molded rubber praducts, it is an ideal absorbent for explosives, and ideal absorbent for explosives, and fertilizers (with built in incerticides?), and an effective mild observe, for cleaning metal surfaces, such as molds.

os molds.

Other prospective uses include very fine filtration work; as a binding agent and moisture absorbent in are processing; as an anti-binding agent to give desired porosity after burn-out in products like

For samples, further information and specifications, please write:



Dept. L-3C

Wilner Wood Products Co., Norway, Me.

available polyethylene. These properties are significant in applications such as power cable wnere, it has been tound, momentary overloads and concomitant nigh temperatures are likely to occur.

The low-pressure polymer resists oxidation to a greater degree than other polyethylene polymers, but oxidation resistance will still be a limiting factor on the high temperature, long-time performance of the low-pressure-processed polymer.

The electrical properties (Table IV, p. 102) are about the same for both type polymers. Some general mechanical properties of highpressure and low-pressure polyethylene are compared in Table V, p. 102.

The low-pressure polymer's physical and electrical properties show it to be a suitable material for both insulating and jacketing applications. The new polymers have better deformation resistance, which is desirable for multi-conductor assemblies where deformation problems are often encountered. They will unquestionably make an outstanding supplement to the conventional polymers used for wire and service drop cable coverings and may eventually expand the potential use of polyethylene as a jacketing material over lead.

Commercial availability

Very small quantities of lowpressure polyethylene were available in 1956. It is expected that in 1957 this low-pressure material will be commercially available in significant quantities in the United States. The production capacity at the end of 1957 should be about 100 to 150 million lb. per year.

The wire and cable insulation field is currently exhibiting a healthy growth which is expected to continue into the future. The use of polyethylene for outside wire and cable as a sheath material has resulted in an expanded field for a material originally of prime interest to cable engineers only as a dielectric. Further developments in both cable materials and cable design will broaden the uses of polyethylene in this industry.-END



11 W. Pennsylvania Avenue

TOWSON 4. MARYLAND

kerf by 20% OR MORE!



SAW BLADES

Made especially for cutting Made especially for cutting operations where thin kerf requirements will save you material and money! Greater operational ease—leas operator fatigue. You get an unbelievably smooth cut without fuzzing or chipping. Available in a complete range of sizes, tooth designs and tin grades to tooth designs and tip grades to fit your operations. Write to-day for full information!



IDEAL FOR CUTTING-

• Thermosetting and Thermo Plastic • Hardboards • Fermica • Balsam Wood • Light Gauge Non-Ferrous Metals and other simi-larly expensive materials!



Gentlemen: Please send additional information about Karbide King THIN RIM Blades. MP-2 COMPANY

DELUXE SAW & TOOL COMPANY

MAIN OFFICE - 510 fast Main Street, Lauisville, Kentucky MIDWEST OFFICE - 5667 N. Milwaukee Ave., Chicago, Illinoi CANADA - Preston Sales and Service, Preston, Ontario



For your difficult baking and drying jobs.

The most efficient radiant heater you can buy.

- . BEST FOR PAINT BAKING
- BEST FOR PLASTIC FORMING
- BEST FOR FOUNDRY CORES
- BEST FOR TEXTILE DRYING
- BEST FOR PAPER DRYING

If you need a Clepco Radiant Heater



you are paying for it every day.

SEND FOR COMPLETE INFORMATION

THE CLEVELAND PROCESS COMPANY



HELPFUL BOOKLETS FREE!

VINYL STABILIZERS. Folder contains comparison chart providing chemical compositions and principal properties of line of 15 vinyl stabilizers. Discusses specific applications for each. National Lead Company. (B-729)

PRIMER ON GLASS-REINFORCED PLASTICS. 26-page booklet describes applications for fibrous glass-reinforced plastics. Gives properties of reinforced alkyd, polyester, phenolic, melamine, and polyesters. Contains description of molding processes required. Owens-Corning. (B-726)

INJECTION MACHINE NOZZLE CATALOG. 48-page catalog provides illustrations, diagrams, and specifications of line of stock replacement and special purpose nozzles. Includes general discussion of characteristics and working parts of nozzles. Injection Molders Supply Co. (B-721)

HOT WORK DIE STEEL. Literature contains data on composition features and characteristics of die steel suitable for applications where dies are subject to heavy pressure or impact while in contact with heat. Includes discussion of general heat treatment of the steel. Firth Sterling, Inc. (B-712)

Any of the booklets described here, plus many othersforty-four in all-are available for the asking, without charge or obligation.

Just turn to the Manufacturers' Literature Section in this issue (pages 189-190), circle the numbers corresponding to the booklets you want, fill in the reply postcard, and mail. No postage needed.

We'll see that you get the literature you request promptly.

A Service Of

MODERN PLASTICS

A Breskin Publication

575 Madison Ave., New York 22, N.Y.

Penton

(From pp. 150-156)

subjected to 60 lb. steam pressure (320° F.) for 18 mo. without change in dimensions. Threaded joints are used and the valve supports the operating mechanism.

Another example of the performance of this valve (Fig. 5, p. 156) was demonstrated in one of Hercules plants. The valve was used in an HCl line of a chlorination reaction. A pressure build-up in the tank caused the hot chemicals to flash back through the line. The lines were of a vinyl compound and the valve of Penton. The valve is in perfect condition The lines had to be replaced.

Enclosed refrigerator motors containing wedges and slot liners for stators made from Penton sheet stock, have been in operation for 2 yr. at elevated temperatures. No breakdown has been observed, and the polished surfaces of the system are as good as they were initially.

Figure 6, p. 156, shows a few of the items that appear to be logical applications for the new polymer.

The ball-bearing retainer ring seals have been used and found to be quite satisfactory and in fact superior to other materials now being used for this job. The properties demonstrated are dimensional stability and bearing characteristics.

Because of Fenton's high degree of dimensional stability, it is finding use in clock mechanisms, timing devices, and other applications where accurate molding, retention of dimensions, and satisfactory bearing and gear qualities are required. The gears shown have been run for 1000 hr. at ½ hp. and 1000 r.p.m.; only a magnifying lens revealed any wear.

Of interest today for packaging purposes is the product in film form. Low permeability, high tensile strength (Mylar range), resistance to sterilization, and high clarity all indicate that the material will be of value in this field.

The Penton rope offers real possibilities. It has better abrasion resistance and tensile strength than a Manila rope, with chemical resistance properties that will allow use in adverse chemical environments.—End



Quality Pigments for Plastics

Specify Cyanamid pigments for every coloring requirement in plastics... and you can be sure of uniform high quality and top pigment performance.

Ultramarine Blues Phthalocyanine Blues and Greens Chrome Yellows, Oranges, Greens Valencia Orange Iron Blues
Organic Toners and Lakes
UNITANE® Titanium Dioxide
—Anatase and Rutile Types

Color is the difference



AMERICAN CYANAMID COMPANY
PIGMENTS DIVISION
30 ROCKEFELLER PLAZA, NEW YORK 20, N. Y.

Branch Offices and Warehouses in Principal Cities

Environmental stress

(From pp. 146-148)

submerged in boiling water for 30 min. and shall then be equilibrated to $23\pm1.1^{\circ}$ C. $(73.4\pm2^{\circ}$ F. as defined in A.S.T.M. D 618. Stress cracking tests shall be started within 24 hr. after the boiling water annealing has been completed. The test specimens shall not be bent and shall not be treated with the reagent until immediately prior to the test.

Procedure

8. a) Each specimen shall be given a controlled imperfection on one surface as shown in (A) of Fig. 2. A sharp blade mounted in the jig shown in Fig. 1 shall be used for making this imperfection. The blade should be replaced whenever there is any question of its having become dull or damaged. In no case should it be used for more than 1000 specimens.

b) The rectangular brass bar is placed lengthwise in a channel with the ³/₁₆ in: wide side resting on the bottom. The bar

may be centered in the channel by placing an unbent specimen on either side as a spacer. A test specimen is bent, with the controlled imperfection on the outside, to form a loop until the inside tips are brought to rest against the sides of the guide bar extending above the channel. The specimen is then forced down until it rests on the bottom of the channel. When 10 specimens have been inserted the spacers are lifted out and the guide bar removed by sliding it through the bent specimens.

c) Within 10 min. of the time the first specimen is introduced into the holder, the holder shall be inserted in the test tube. The tube is then filled to approximately 0.5 in. above the top specimen with reagent that has been adjusted to a temperature of $23\pm1.1^{\circ}$ C. The tube is then stoppered with a foil-wrapped cork and immediately placed in the constant-temperature bath at $50.0\pm0.5^{\circ}$ C. The controlled imperfections should not be touching the test tube during the test.

NOTE: The heat capacity and the heat input capacity of the bath should be high enough so that the temperature does not drop below 49.5° C. when the samples are added.

Routine inspection and acceptance

 For routine inspection of materials it shall be satisfactory to accept lots on the basis of testing 10 specimens for a specified time. Not more than five shall fail.

Report:

10. The report shall include:
1) Percent failed specimens at specified time, 2) complete identification of material tested, 3) date of test, 4) name of observer.

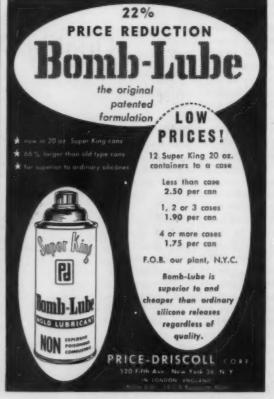
References

R. H. Carey, ASTM Bulletin, No. 167, 56 (July 1950).

J. B. DeCoste, F. S. Malm, and V. T. Wallder, Ind. Eng. Chem. 43, 117 (1951).

I. L., Hopkins, W. O. Baker, and J. B. Howard, J. Applied Physics 21, 206 (Mar. 1950).—End







master batch color concentrates for polyethylene, polystyrene, high impact polystyrene, vinyl. Amazing variety! Exciting special effects! Custom colors you never believed possible...plus a choice of 8 great standard colors! Never any dusting...never any color contamination! MASTER COLOR offers unusual new opportunities and matchless economy for com-

Kromaplast DRY COLORANTS

dry colorants for injection molding and extrusion.

pounders, extruders, film processors, blow molders.

Opens up limitless new possibilities for in-plant coloring of thermoplastic molding compounds! Easy ... reliable ... effective! Handsome special colors ... dramatic special effects! Standard colors that set new standards for clarity and fidelity! Light-fast, heat-resistant, non-bleeding!

Now... new economy and exceptional fidelity of color for thermoplastic compounders, extruders, film processors, injection molders! Colors proved in actual use in our own color compounding operations. Complete control from initial pigment development through manufacture of the color concentrates enables us to make MASTER COLOR and KROMAPLAST always uniform... always more satisfactory...
... always most economical!

WRITE FOR PRICE LIST

AMERICAN MOLDING POWDER AND CHEMICAL CORPORATION

703 BEDFORD AVENUE, BROOKLYN 6, N. Y.

FEBRUARY 1957

High-shear-rate

(From pp. 137-144)

clusion of air in a plastisol, the actual density rather than a calculated value is used.

Example:

Test formula: Resin 100 DOP 60

Actual density 1.16 g./cc.

Severs orifice

Diameter 0.3280 cm. Length: 5.0 cm.

Pressure: 60 p.s.i.g.

Flow rate at 60 p.s.i.g.

25 g. in 10 sec.

Viscosity = $\frac{\text{p.s.i.g.}}{\text{g./sec.}} \times \text{K}_1$

 $K_1 = \frac{\left(\frac{0.3280}{2}\right)^4 \times 1.16 \times 6.895 \times 10^4 \times \pi}{8 \times 5.0}$ = 4.55

Viscosity = $\frac{60}{2.5} \times 4.55 = 109$ poises

Shear rate = K2 × g./sec.

$$K_s = 4/\pi \times \left(\frac{0.3280}{2}\right)^5 \times 1.16 = 250$$

Shear rate = $250 \times 2.5 = 625 \text{ sec.}^{-1}$

$$Shear stress = \frac{PR}{2L} = \frac{60 \times \left(\frac{0.3280}{2}\right)}{2 \times 5.0}$$

= 0.984 p.s.i.

An interesting point about the Severs rheometer is that doubling the orifice diameter will enable you to double the measurable shear rate range for Newtonian and near-Newtonian fluids at equivalent pressures as shown by Poiseuille's Law:

Shear rate =
$$\frac{4Q}{\pi R^3} = \frac{P}{2LV} \times R$$

Since the pressure and orifice length are held constant, doubling the orifice radius will approximately double the shear rate for a given pressure if the plastisol is near-Newtonian in nature. For non-Newtonian plastisols, a larger-size orifice will not actually double the measurable shear

rate but will allow for higher shear-rate measurements.

The help and advice of Martin J. Kleinfeld and members of the Marvinol Development Section, are gratefully acknowledged.

References

1. Unpublished reports, Naugatuck Chemical Div., U. S. Rubber.

2. "Viscosity stability of plastisols," by Darby and Graham, Mod. Plastics 32, 148 (June 1955).

3. "Interpretation of Brookfield viscosities," by Bowles, Davie, and Todd, Modern Plastics 33, 140 (Nov. 1955).

4. "Flow properties of vinyl chloride resin plastisols," by Severs and Austin, Ind. Eng. Chem. 46, 2369 (Nov. 1954).

5. "Industrial Rheology and Rheological Structures," by H. Green, John Wiley, 1949.

6. "Flow Properties of Disperse Systems," by J. J. Hermans Interscience Publ.

7. "Rheology of plastisols," A. C. Werner, paper given at S.P.I. Film, Sheeting and Coated Fabrics Meeting, Dec. 1956.—End

SHEET LAMINATING

Recognizing the need for reducing production expenses to a minimum, cost-conscious laminators turn to Becker & van Hüllen installations featuring automatic loading, unloading and sheet handling. The reliability of these presses is world renowned.

We'll gladly supply details on any type of laminating or compression molding equipment.

Sole U. S. Representative



KARLTON MACHINERY CORPORATION 210 E. Ohio St., Chicago 11, III.

BECKER & VAN HÜLLEN / KREFELD



STRIKES AGAIN with their NEW EXTERNAL METALLIZING



CUSTOM MOLDED
PLASTIC PARTS



RADIO-TV KNOBS

CUSTOM MOLDED CLOCK PARTS



RADIO-TV TUNING PLATES

For applications involving metallized surfaces ERIE PLASTICS offers their new External Metallizing to plastic as the economical way to achieve the richness and lasting luster equal to electro-plating on metal.

This new Top Surface Metallizing technique provides a finish which looks and acts like metal plating, combining practicality with lasting beauty in functional ornamental parts. Many special color effects can be obtained to suit the customers' requirements. It will not tarnish, pit, or rust, and maintains its brilliance under adverse weather conditions.

In achieving the effect an evaporated metal film is deposited on a specially developed, firmly adherent, tough organic undercoat, and is then protected by a clear and marresistant topcoat.

After extensive development ERIE engineers and designers have perfected an exclusive finish able to meet the rigid requirements of customers such as PHILCO and GENERAL ELECTRIC — TELECHRON Clock. The External Metallized finishes are required to pass score-and-tape tests, as well as humidity, fading, and thermal shock tests.

ERIE Sales Engineering Department is available to help solve your metallizing problems.



ERIE PLASTICS DIVISION

ERIE RESISTOR CORPORATION

Main Offices and Factories: ERIE, PA.
Manufacturing Subsidiaries

HOLLY SPRINGS, MISSISSIPPI + LONDON, ENGLAND + TRENTON, ONTARIO

The Plastiscope

News and interpretations of the news By R. L. Van Boskirk

Section 2 (Section 1 starts on page 45)

Vinyl film meeting

"Give your customer what he wants instead of what you think he wants" was the substance of the propelling charge in the cartridge fired at members attending the S.P.I.'s recent film sheeting and fabrics conference by Bill Gove, vice president of E. M. C. Recordings, Inc. Mr. Gove, giving a repeat performance, probably surpassed even his highly popular 1955 presentation in which he hammered home the same message. Any new industry such as the vinyl business needs subtle truths pounded home by a capable authority such as Mr. Gove, who can coat his stinging needle with a soothing ointment that makes it feel good even when it

But if the representative from the automotive industry who spoke at the same meeting is correct, the vinyl industry is rapidly learning how to give the customer what he (the customer) wants. A person may even wonder what could possibly have been used before vinyl.

Testing for automotive use. The description of testing methods employed before a piece of vinyl goods can be accepted was indicative of what is demanded. For example, no adhesion transfer or migration is acceptable when a specimen is heated to 180° F. for a long period of time in contact under pressure of approximately 2 p.s.i. for a minimum of three hours. This same piece of goods must resist stiffening at low temperature. If there is any loss of emboss or change in sheen after about the same treatment, the vinyl is rejected. If it shrinks under a steam treatment, it is no good. There are a dozen other *Reg. U.S. Pat. Off.

tough tests to undergo and, in addition, the vinyl has to be less costly than most other materials. It certainly sounds as if the customer was unquestionably the boss man on this job.

Some of the vinyl applications now improving their status in automotive use, in addition to the older trim items, are 0.006- and 0.008-in. film backed by sheeting for head linings; vinyl applied to jute for carpeting; top deck covers of a cloth-rubber-cloth sandwich, topped with an embossed vinyl; a door panel, manufactured by a dielectric bonding process, which consists of a vinyl-coated hardboard, a vinyl-impregnated fiber pad, and a vinyl film or supported vinyl covering all bonded together; vacuum formed vinyl panels for doors and other interior spots; vinyl covered crash pads for dash panels and sun visors; and rigid vinyl front seat side shields.

Luggage is another product that is making wide use of vinyl after several years of indecision, according to E. H. Heitler of Schwayder Bros. Dollars spent in travel have grown from 7 billion ten years ago to 20 billion. But luggage fabrication has shown only a 27% increase. Total sales in 1956 are estimated at around \$200 million, or only slightly more than 1947. Total purchases of vinyl film and sheeting for this business is not over \$7 million a year but could be doubled in the next 10 years.

Vulcanized fibre was the first plastic to be used in large volume for luggage. In 1947-48 the luggage industry became interested in vinyl. Since then has come the vinyl-to-metal laminates. Today it is estimated that approximately

70% of all luggage is using some sort of plastic covering.

Since 1947, men's luggage with plastic covering has grown from 40 to 65% of the total; women's styles have increased from 43% leather to 89% plastic. Not only have plastics materials proved successful, but they contribute immeasurably to the outstanding demand today for light weight. Fifty-four percent of the luggage merchants surveyed by Schwayder said that they preferred plastic over other materials for durability.

Agricultural uses. A field where volume is expected to be far greater in the future than today is in agriculture, according to John Murphy, technical service manager of Monsanto. But it was noticeable that Mr. Murphy frequently used the word "plastic" rather than vinyl. He stated that these farm markets will eventually amount to 50% of the total 1955 sales of vinyl film and sheeting in this country. His projected figure for "plastic" film was 100 million lb. by 1965, but he made no separation between vinyl and polyethylene. He also said that 40% of the calendered film produced in Japan is used for agricultural purposes.

The agricultural markets which Mr. Murphy listed included greenhouses; vinyl liners for irrigation ditches and ponds, using 4- to 20-gage film; and mulch for row crops. Any one of these various markets could require hundreds of thousands of pounds of film or sheeting if universally adopted.

Ways to improve. No S.P.I. film meeting is ever held without someone taking the opportunity to "blast" the industry. Probably it is wise to let the manufacturers know that there are still many ways to improve their product. This time the "blaster" was a designer who complained that the vinyl industry was weak in original design. The complaint has been made every year since World War II. And designers in particular are the ones who complain about "weak" designs in plastics. Should an observer be blamed if he is puzzled over this complaint of designers about designers? And the puzzlement may become even



FIBERFIL, Inc. . FOX FARM ROAD . WARSAW, INDIANA

The Plastiscope

more severe when it is noted that users have to be hammered over the head before they will accept new designs in plastics when they are put on the market.

Market research. A suggestion that film and sheeting manufacturers could make much more widespread use of market research was offered by Gordon Brown of Bakelite. Said Mr. Brown: "The unique properties of vinyl film are needed in untold thousands of places of which we are unaware. They are not being used because the potential user does not know our materials the way we know them." He pointed out that a good market researcher could not only smell out new markets but could point out the problems to be expected in such markets and make plans to overcome them before his company's product ever reaches the con-

The technical section of the industry was also well represented at the meeting. Among the "meaty" papers was one on adhesives for vinyl by Richard C. Lillie of Angier Adhesives Div., Interchemical Corp. One paragraph from his talk gives an idea of the importance of his subject and tells why vinyl users should examine his paper. Said Mr. Lillie: "In general, specific adhesion is higher with solvent adhesives than with aqueous formulations due to the greater variety of resins available, many of which are difficult or impossible to emulsify. The vinyls, being more receptive to most solvents, provide an added advantage in wetting out the film. Aqueous adhesives have their place, however, as they do not tend to extract plasticizers which minimize adhesion. They eliminate the danger of trapped solvent on non-porous combinations and provide excellent adhesion between vinyl and porous surfaces in which mechanical anchorage can be ob-

A technical report from Farrell-

Birmingham presented the rather revolutionary idea of a 4-roll calender which incorporates a separate motor for each of the rolls. A calender expert passed the opinion that it is difficult enough to control four rolls as they are now, let alone handling each one separately. But F-B has ideas that separate handling will be more simple.

Also reported at this meeting were details on a method for measuring heat stability of vinyl calendering compounds by other than conventional milling tests; the latter are not always reliable because calendering speeds are so much faster than conventional milling speeds. A newly acquired multispeed mill was the basic instrument involved.

Still another technical paper was built around testing viscosity of plastisols in order to develop a formula which at high shear is sufficiently high to prevent "strike-through" yet low enough to allow for proper leveling of the coating.

Vinyl film adhesives

Three new vinyl copolymer-based adhesives for cementing vinyl chloride films have been announced by National Adhesives Div., National Starch Products, Inc., 270 Madison Ave., New York, N. Y. The adhesives are said to be free from dangerous solvents and to present no fire hazard or problem of toxic fumes.

Resyn Emulsion 33-8020 (containing about 54% solids and with a viscosity of 1000 to 1500 cp.) is a general-purpose emulsion for adhering vinyl film to cloth, paper, and paperboard. It may be applied by a reverse roll coater, gravure, or air knife. From 200 to 250° F. is required for drying. The coated fabric or paper can then be combined at a nip temperature of 275 to 300° F., depending upon machine speed.

Resyn Emulsion 33-8010 has similar properties to Resyn 33-8020 but has a viscosity of 5000 cp.; it is preferred for knife coating and is suggested for the lamination of vinyl film to latex saturated paper.

Resyn Emulsion 33-8030 contains some non-flammable solvent and is suggested for the wet-combining of vinyl chloride to paper-board and wood. It contains approximately 49% solids and has a viscosity of 1000 centipoises. All three products may be thinned with water.

Dry-blend resins superior

Lower processing costs and increased extrusion rates have resulted from the use of Pliovic dry-blending resin in the production of door gaskets for several 1957 model refrigerators, according to the Chemical Div. of The Goodyear Tire & Rubber Co., Inc., Akron, Ohio. The vinyl gasketing is used to provide a positive, low-compression seal in refrigerators built with low-pressure magnetic door latches.

Pliovic dry-blend resin is a straight polyvinyl chloride polymer produced by Goodyear. Among additional benefits claimed are lowered power and maintenance costs, uniformity in the dry-blended compound, and uniform and rapid transition from compound to extruded product. The vinyl compound is fluxed once, and only long enough to form a free-flowing compound to produce an end product with a minimum heat history.

The vinyl seals were designed for Hotpoint, Westinghouse, Quick-Freeze, Ben Hur, Whirlpool, Seegar, and Gibson refrigerators.

Reinforced liner

Conoglas, a new flexible glass fabric-reinforced polyester, has been developed by Continental Can Co., 100 E. 42nd St., New York, N. Y., for lining bins, tanks, freezers, freight cars, trucks, and similar food storage and shipping containers. The material is produced by a continuous process and is available in rolls up to 150 ft. in length or in cut-to-size sheets. Standard width is 36 in.; thickness is 0.018 in., and weight is 0.150 lb./sq. foot.

The company states that Conoglas imparts a durable, wear-re-



From lightweight greenhouse panels to decorative partitions for home and office . . .

Pittsburgh

are now ready for a thousand new uses!

Just a few products in which Pittsburgh SELECTRON Resins are now used-

Aircraft structural parts Radomes for electronic equipment Life floats **Ballistic panels Boat hulls** Machinery housing and guards Trays **Tote boxes** Food lockers Garbage pails Baskets for automatic dishwashers

Baskets for automatic washers Wash tubs Tool chests Shipping containers

Instrument cases Laundry hampers Kitchen containers Fishing rods Sinks Street signs

Fluorescent light fixtures Television cabinets Loudspeaker housings Gas meter housings Structural panels for offices and homes Door and transom lights Awnings and canopies Greenhouse panels Skylighting

Molded chairs Prefabricated houses and garages Truck bodies

DITTSBURGH'S SELECTRON Polyester Resins are playing an important part in the development of new materials for building and decorating. They are being used in the making of clear and colorful panels that have a wide range of applications—from sidelights and skylights of greenhousesto decorative partitions that add sparkle and beauty to office or home.

SELECTRON Resins give these panels unusual weather resistance, easy moldability and exceptional light stability. Reinforcing fillers give them ex-ceptional strength with low weight, impact toughness and dimensional stability. Being translucent, these panels diffuse daylight without glare. They possess low thermal conductivity.

Above all, these panels are very economical to use. They often cost only half as much to install as conventional materials. They are practically maintenance-free.

SILECTRON Resins offer almost end-less possibilities to alert, progressive manufacturers. If you are designing a new product-or redesigning one you are now making-SELECTRON may help you make it lighter, stronger, more durable and, probably, at lower cost. We'd be glad to have one of our engineers discuss your problems with you without cost or obligation.

Send For FREE Booklet!



GLASS PLATE G H IN CANADA: CANADIAN MITTSBURGH INDUSTRIES LIMIT

The Plastiscope

sistant, stain-resistant, and waterproof surface to containers, which will not support the growth of either mold or fungus, and is unaffected by alcohol, mineral acids, vegetable oils, salt water, weak alkalis, toluol, heptane, carbon tetrachloride, and other chemicals.

Anticipated uses include liners for food store display fixtures; commercial refrigerators; freezers; dairy, food and chemical tanks and bins; and others.

Board-surfacing resins

Two new modified melamine resins, Cyzac 2247 and Cyzac 2352, are now available in commercial quantities from American Cyanamid Co.'s Plastics and Resins Div., 30 Rockefeller Plaza, New York, N. Y., for board-surfacing applications. Cyzac 2247 is recommended for impregnating printgrade laminating papers; Cyzac 2352 for impregnating overlay-grade laminating papers.

The company states that overlay-grade laminating papers impregnated with Cyzac 2352 may be laminated directly to wood surfaces (clear or stained) to produce, at moderate cost, a transparent, colorless finish with good surface properties. It is expected that the resin will broaden possibilities for producing pre-finished lumber products at lumber mills.

Printed laminating papers impregnated with Cyzac 2247 are used in conjunction with Cyzac 2352 to produce decorative surfaced hardboard for use as wall panels, door panels, cabinets, various do-it-yourself applications, low-cost furniture, and TV cabinets.

Irradiated polyethylene

Plans for increasing by over 400% the present capacity for producing Irrathene irradiated polyethylene have been announced by General Electric. Newly-constructed facilities at Pittsfield, Mass., will boost production from 300,000 lb. to 1,600,000 lb. annually—and with

an eye to the future, provisions have been made in the plant for a possible doubling of that capacity at a later date.

GE's wire and cable people are also currently evaluating an irradiated extrusion grade compound, E-234, designed for wire coating and insulating. The compound can be extruded directly onto wire as easily as conventional polyethylene and is claimed to give an insulation that preserves the good electrical and chemical properties of Irrathene. Also in the development stage is a semi-conducting irradiated polyethylene tape for power cables, a new grade of tape to withstand physical stress at temperatures higher than 350° C., and heat shrinkable tubing for use as lead insulation, ground insulation on small component parts, and as a corrosion barrier.

New metallizer

Brutier Products Co., 1615 Paterson Plank Rds., Secaucus, N. J., is a newly organized firm specializing in the coating and metallizing of plastics film. The company is currently marketing the decorative film for use in point-of-sale displays, novelties, packaging, etc.

Walter Steinmann is president and Richard Benjamin sales manager.

Hypalon for cloth coating

A new, improved Fairprene tarpaulin material providing greatly improved abrasion resistance is being offered by Du Pont's Fabrics Div. The company originally offered only a nylon fabric coated on both sides with neoprene rubber compound. The new tarpaulin, recently added to a complete line of Du Pont neoprene-coated fabrics, offers remarkable abrasion resistance in combination with lightness by virtue of a coating of Hypalon synthetic rubber on the underside. Hypalon is produced from polyethylene.

Service tests show that the ma-

terial is more resistant to wear inflicted by the rubbing against cargo or vehicle. The exterior surface is coated with black neoprene noted for excellent weathering properties. The surface coated with Hypalon is readily identified by its gray color.

Adhesive-backed urethane

Polyurethane foam with a "nonstretch" pressure-sensitive adhesive coating is now available from Durable Rubber Products Co., 609 W. Lake St., Chicago, Ill. The material, in a range of colors, is furnished in continuous-length rolls of various widths, die cut to specifications, or fabricated in shapes and forms.

Jamaica beckons

The Government of Jamaica, B.W.I., has eliminated or substantially liberalized its industrial income tax laws and import duties in a move to stimulate capital investment on the Island by the American plastics industry.

In the Industrial Incentives Law, freedom from income tax for periods up to seven years is provided. A special option provides that a manufacturer may operate in Jamaica and delay application of the tax law for any period up to three years after which he is free of income tax for four years, and pays on one third of his income in the fifth year and on two thirds in the sixth year.

The Export Industry Encouragement Law provides exemptions similar to those of the first law as well as the right to import factory materials, machinery, and fuel duty-free and the right to import raw materials from any part of the world duty-free. The single stipulation: a company operating under this law cannot dispose of its products in Jamaica.

S.P.I. acts on MILs

Faster and more accurate development of military specifications calling for reinforced plastics is the objective of the newly formed Military Specifications Committee of the Reinforced Plastics Div. of the Society of the Plastics Industry, Inc. The committee hopes to achieve manufacturing economies



"Job-Fitted" HYDRAULIC PRESS



Those tough production problems that require something extra in plastics molding and hot-plate laminating are just the kind that Elmes engineers like to be called in on. More than 60 years in the specialized field of hydraulics has built the Elmes reputation for recommending and supplying hydraulic presses that are "job-fitted" for profit-making performance, no matter how special the job.

While a wide range of standard Elmes® Press designs meet all usual requirements in plastics molding and laminating work, the development of special presses "job-fitted" to the customer's exact requirements is a major part of Elmes engineering service. Whatever your pressing problem, it will pay you to call in Elmes for consultation and recommendations. Distributors in principal cities.

American Steel Foundries

EIMES ENGINEERING DIVISION

1159 Tennessee Avenue, Cincinnati 29, Ohio

METAL-WORKING PRESSES · PLASTICS MOLDING PRESSES · PUMPS · ACCUMULATORS





with improved heat stability for you

Escambia's modern plant near Pensacola, Florida, is now producing the following general-purpose, easy-processing resins:

ESCAMBIA PVC 1250 high molecular weight, recommended for extrusion of shapes and profiles and for calendered film.

ESCAMBIA PVC 1225 intermediate molecular weight, particularly adapted for supported and unsupported sheeting.

ESCAMBIA PVC 1200 lowest molecular weight in this series, designed for flexible and rigid sheeting.

and

following these—Escambia will produce additional PVC resins for other specific purposes, including types for rigid and electrical applications.



Calendering and extrusion operations

Technical Service

ESCAMBIA PROVIDES a well-staffed, fully-equipped customer and technical service laboratory ready to aid you in producing better products in your plant.





Viscosity measurements

Quality Control

is maintained by constant technical supervision of all production to assure highest quality and uniformity of Escambia products.

For additional information about Escambia's new resins with improved heat stability and other processing advantages for the calendaring, molding and extruding industries—write the address below on your letterhead.



ESCAMBIA CHEMICAL

CORPORATION

261 MADISON AVENUE . NEW YORK 18, N.

The Plastiscope

and administrative efficiencies in the production of military requirements involving reinforced plastics through a cooperative industry-government effort.

Discussion with appropriate government agencies and plastics industry representatives have already begun and are aimed at developing procedures and practices to expedite the formulation of realistic and representative specifications. James Lunn, Lunn Laminates, Inc., is chairman of the committee.

Important happenings in vinyl

The development of triple lamination (fabric between two vinyl layers) was perhaps the most important technical advance in the vinyl film and sheet industry in 1956, according to Fred S. Strauss, president of Harte & Co., Inc. He also stated that other highlights of the year include: use of calendered non-toxic film for food packaging; the application of Jean Fresnel's theory of light and its reflection to give a three-dimen-. sional effect to embossed film; use of vinyl film for insulation by the building trade; building of vinyl resin plants by users of the resin; and reduction of film prices to from 8 to 10% below the 1955 level.

Plastics grants

Several fellowships and research assistantships for graduate studies in plastics engineering are available at Princeton University. Fellowship stipends range from \$1500 to \$2100, plus tuition and fees. Opportunities for employment as half-time research assistants at \$1800 per academic year are available to students not on fellowships.

The Princeton engineering curriculum of graduate study and fundamental research in plastics leads to the degree of Master of Science in Engineering. Applicants for admission must hold a Bachelor's degree in engineering or physical science from a recog-

nized institution and must meet general admission requirements of the Graduate School of Princeton University. (See "Plastics engineering at Princeton," MODERN PLASTICS 34, 175, October 1956.)

Goodyear now in radiation

Latest entry to the ranks of those who have established radiation facilities is The Goodyear Tire & Rubber Co., Inc. which has announced the opening of a \$125,000 fully equipped radiation laboratory. While the facility is primarily designed for the exploration and development of rubber products which will perform satisfactorily in a radiation environment, other goals of the irradiation program will seek to initiate chemical reactions, polymerization, and vulcanization, and to improve physical properties of plastics and resins.

Campco licenses French firm

Societe Plymouth Francaise, S.A., of Feyzin, Isere, France, has entered into a licensing agreement with Campco Div., Chicago Molded Products Corp., to manufacture Campco-type styrene alloy sheet. The agreement provides for French representatives to be trained in the United States by Campco in technical and merchandising methods, and for an interchange of ideas and machinery between the two companies.

Campco recently concluded a similar agreement with an Italian firm, Pirelli S.p.A, Milan, Italy.

Silk screen colorant

Availability of RV-300 color concentrate for silk screening and roller coating of all plastics, except cellulose acetates, has been announced by Logo, Inc., Chicago, Ill. Screening and roll-on inks are made from the concentrate by adding a clear base and thinners to secure the desired gloss and viscosity. Standard colors will be available for color shading and matching.

According to Logo, RV-300

passes refrigeration specifications; its adhesion to thermoplastics passes the cross-hatch Scotch tape test; humidity resistance exceeds 1000 hr. at 110° F. and 100% humidity; and grease resistance exceeds 100 hr. in a 50-50 mixture of lard and oleic acid at room temperature.

Swedish rollers in U. S.

Long active in the manufacture of steel roller engravings for the plastics, paper, and textile industries in Europe, Swedish Roller Engraving Co., Gothemburg, Sweden, has established Swedish American Roller-Engraving Co., 830 Broadway, New York, N. Y., to serve these industries in the United States and Canada. Warren Schlesinger is manager.

Tubing for pens

Specialty pen manufacturers and other firms using plastics tubing in several sizes can now take advantage of special prices by combining orders for several sizes of tubing into one. According to a plan developed by Anchor Plastics Co., 36-36 Thirty-sixth St., Long Island City, N. Y., customers are now able to specify up to three sizes of tubing in a combined total of 500 pounds. Heretofore, it had been difficult or costly for specialty manufacturers to obtain their various tubing requirements as needed.

To serve metallizers

Formation of a new division, Vacuum Coatings, Inc., to handle and formulate finishes for vacuum metallizers has been announced by Industrial Solvents & Chemicals, Inc., Wilkinsonville, Mass. The new organization will supply technical information and materials for those interested in doing vacuum metallizing and offers to metallize and finish on request small parts sent to it.

Paper for laminating

A fire-retardant X-Crepe stretchable, cross-creped industrial paper material has been developed by Cincinnati Industries, Cincinnati, Ohio, for lamination to vinyl film and other applications. The paper, available in roll or sheet form, can be stretched 15 to 66%

longitudinally and 15 to 45% laterally. It can also be die-cut, sewn, or slit; fed from rolls into high-speed machinery; glued, cemented, or saturated; formed under heat and pressure; and embossed, indented, or printed.

Color-coded gaskets

Gasket and shim stock made of a variety of thermoplastic materials, color-coded to indicate the 12 different thicknesses in which it comes, has been introduced by General Gasket Co., Industrial Rd., Clifton, N. J., under the name of Color-Plast. Offered in sheet and roll form from 1 to 30 mils thick, each gage of the material is identified by its own color. The material is also available in the form of die-cut shims.

Fast foam

Development of a two-component system for producing Nafil polyurethane foams that will foam, set, and cure very quickly without the use of external heat or pressure has been announced by Chase Chemical Corp., 3527 Smallman St., Pittsburgh, Pa.

The foam is obtained by mixing Nafil AR resin and HM catalyst. A 2-lb./cu. ft. foam, for example, will set in 5 min. and cure in 10 min. at room temperature, according to the company. Foam densities of 2 to 20 lb./cu. ft. are possible. The fast-curing foam is suggested for production line work. Recommended uses include insulation, structural reinforcement, sound deadening, potting, buoyancy, void filling, etc.

Shell radiation research

Installation of a new 3 million-v. electron accelerator at its Emeryville, Calif., laboratory has been announced by Shell Development Co. One of the most powerful radiation sources in industry today, the electron accelerator is being used in research designed to develop new plastics and to study the effects of radiation on other oil products.

New engraving stock

Gravalum, a laminated material with an ebony black phenolic center core bonded between two exterior layers of satin finish aluminum, is now being marketed by Hermes Plastics, 13-19 University Pl., New York, N. Y. Engraving through the top layer exposes contrasting black lettering, eliminating the filling of engraving with paint.

The material is masked on both sides for protection. Engraving is done through the masking material to avoid scratches during handling. It is available in sheets, strips, or cut nameplates in thicknesses of 1/16 and 1/8 inch. Gravalum is said to be most suitable for instrument panels where shielding or grounding is required.

New adhesive resin

Metal name plates can now be bonded to wood, metal, and ceramic surfaces by a furane-modified vinyl adhesive available from Furane Plastics, Inc., 4516 Brazil St., Los Angeles, Calif.

Designated Resin XV, the onecomponent, solvent-type adhesive is applied to the reverse side of the name plate and allowed to dry thoroughly. When ready for application, the name plate is momentarily heated to from 250 to 300° F., and while still hot, pressed firmly against the clean surface to which it will then permanently adhere.

Gas permeability tests

Equipment for testing gas permeability of plastics sheeting, in accordance with A.S.T.M. D-1434-56T "Tentative Method of Test for Gas Transmission Rate of Plastic Sheeting," accepted in June 1956, is now available on order from Custom Scientific Instruments, Inc., Kearny, N. J.

The "gas transmission" units will be built along designs developed by Plastics Technical Service Laboratory of The Dow Chemical Co.. and made available to CSI by that company.

New molding company

New entry in the plastics molding field is Dickmont Plastics Corp., Selleck St. and Harvard Ave., Stamford, Conn., specializing in industrial work, insert jobs, and nylon molding.

Richard Scalise, president of the new company, has had 20 years of experience in the plastics field. He was general foreman of P. M. Industries for 13 years and has also had several years of experience in die making. For the past seven years, Mr. Scalise was production manager of Atlantic Plastics, Inc. Armand Marcucilli, secretary and treasurer, has been associated with the plastics molding field for the past 15 years. His former affiliations were with P. M. Industries, Progressive Plastics, and Merit Creations.

Largest pool

A reinforced plastics swimming pool, 84 ft. long, 36 ft. wide, and from 3 to 11 ft. deep, is being built for the Red Lion Country Club in York, Pa., by Delorich Enterprises, Inc., North Miami, Fla. This is undoubtedly the biggest thing that has ever been done in reinforced plastics.

The company supervising the operation locally is York Reinforced Plastics, York, Pa.

Slowing down urethanes

An improved polyurethane formulation that slows down normal foam reactions of 30 to 60 sec. to 100 to 180 sec. has been developed by Dayton Rubber Co., Dayton, Ohio.

The formulation, a two-component system of polyesters and isocyanates, is specifically designed for rigid foams used in electronic components for aircraft, guided missiles, etc. In addition to providing a safer handling margin, the formulation is said to give a more uniform and finer pore structure.

Textile finish

An epoxy resin which is said to wrinkleproof white cottons, give them a "wash-and-wear" finish, and prevent discoloration has been announced by Shell Chemical Corp., 50 W. 50th St., New York, N. Y. Tradenamed Eponite, the resin, according to the company, permits washing, bleaching and ironing of white goods without yellowing or loss of strength.

Safety glass with silicone rubber

Transparent silicone-based rubber is being tested by the Air Force as an interlayer in windshield glass of new supersonic airplanes in an effort to overcome the problem created for

The Plastiscope

conventional safety glass by the high heat of air friction. This heat can reach such intensity that the flexible, transparent vinyl butyral now used as a windshield interlayer softens and begins to lose strength, making it incapable of preventing the glass from shattering if cracked. The new interlayer is said to retain adequate strength up to 350° F. as compared to the 180° F. limit on present interlayers. It is somewhat cloudier than the plastic material and up to 160° F. has less shatter resistance.

Extensive research work in the lamination process of aircraft glass employing the new interlayer has been done at Libbey-Owens-Ford Glass Co., Toledo, Ohio, under the supervision of Dr. Joseph D. Ryan, director of research, and himself a foremost authority on plastics used in the lamination of glass. The new interlayer is being developed for ARDC Wright Air Development Center, Dayton, by Dow Corning Corp., Midland, Mich.

Shielding material

Lead-filled polyethylene for use in radioactive shielding applications has been introduced by Telectro Industries Corp., 35-16 Thirty-seventh St., Long Island City, N. Y. Designated Leadolene, the compound is said to produce a homogeneous casting that is smooth-surfaced, resistant to oxidation, and recastable without loss of material.

Composition of Leadolene is 95% lead and 5% polyethylene by weight; this can be varied to meet specific requirements. The lead content of the material shields against beta and gamma rays; the hydrogen content (supplied by the polyethylene) against neutrons.

Pipe notes

Tag tells story. Cold water pipe of Tenite polyethylene will now bear yellow and white tags as part of a new program designed by Eastman Chemical Products, Inc., subsidiary of Eastman Kodak Co., to inform purchasers about the material from which the pipe is produced. The tags, supplied to pipe extruders by Eastman for attachment to the pipe, sets forth polyethylene's advantages and uses, a brief summary of suggested applications, and a simple explanation of procedures to be followed when installing the pipe. Space for the pipe producer's imprint is provided

Enters pipe field. Marken Plastics Corp., 2427 E. 55th St., Los Angeles, Calif., manufacturer of extruded plastics products and custom extrusions, has entered the plastic pipe industry with a line of PVC and polyethylene pipe and tubing in a range of sizes from % to 4 in., as well as fittings.

New plant for pipe. Completion of a new 12,000-sq. ft. plant devoted exclusively to the production of PVC pipe and tubing has been announced by Alpha Plastics, Inc., Okner Parkway, Livingston, N. J. The firm offers normal and high-impact pipe in nominal sizes ranging from ½ to 4 in., in 10- and 20-ft. lengths. Also available is a full line of PVC valves and fittings.

Expansion

Borden Co.'s Chemical Div. has started production at its newly completed polyvinyl chloride resin plant at Leominster, Mass. The plant, with an annual capacity of 12 million lb., is Borden's first venture into the PVC producing field and marks a broadening of the company's scope in the thermoplastics fields. Present plans call for a tripling of capacity before the end of 1957.

The Leominster plant consists of two buildings located on a 6-acre site adjoining Borden's Monomer Dept. plant which produces polyvinyl alcohol and polyvinyl acetate. It will produce a wide variety of specialty resins and vinyl chloride latices, as well as general-purpose polyvinyl chloride for the calendering and extrusion field.

At the same time, Borden's also announces plans for the construction of a new laboratory-office building which will serve as a straight development laboratory, a technical service laboratory, and a semi-pilot plant. The lab will be under the direction of Dr. Harry Wechsler, general manager of Borden's Polyvinyl Chloride Dept.

Borden's also announces acquisition of a 21,000-sq. ft. plant and office facilities at Leominster for production of its line of Resinite products, duplicating to a large degree the Santa Barbara, Calif., operations of its subsidiary, Resin Industries. The new Resinite plant will produce vinyl compounds for electrical wire, cable insulation, and jacketing; industrial tubing for the aircraft, electronics, and electrical appliance field; and extruded high-grade medical tubing for intravenous feeding, blood donor sets, catherers, and similar pharmaceutical items. It will also stock Resinite plastic garden hose and flexible plastic sprinklers. Eastern sales manager for Resinite products is Alan Stevens, formerly with Borden's Santa Barbara operation.

The Carborundum Co. will build a new 91,000-sq. ft. multi-million dollar plant in Van Wert, Ohio, where its Bonded Abrasives Div. will manufacture small vitrified abrasive wheels up to 14 in. in diameter in large volume and by automatic production methods.

The building, scheduled for completion in late 1957 and for full production by the end of 1958, is part of Carborundum's \$30 million modernization and expansion program scheduled for 1957 and 1958.

Shell Chemical Corp. has completed two new Epon epoxy resin units at its Houston, Texas, plant that will triple its production of the resins. One of the units will



Choose from 11 Styron formulations—for performance by the packageful

What makes Styron® the leading polystyrene material? In one word, the answer is *performance*... performance in both the molding and in the product. Whatever package you specify to best fit your needs, it's what's inside that counts.

This superior performance is available in many formulations—the most complete line of polystyrenes ever offered. Styron formulations are tailor-made to perform in more jobs—more economically—for you.

Do you need improved flow or better extrusion characteristics? There are new formulations of Styron to meet your specific needs.

Want high-impact materials with greater heat resistance and glossier surfaces? Whatever your polystyrene requirement may be, there are more chances that you'll find a new formulation of Styron to provide your answer.

All are particularly well suited to high-volume molding and, because of their superior flow properties, many offer important savings in production time!

For free technical literature, write THE DOW CHEMICAL COMPANY, Midland, Mich.—Plastics Sales Dept. PL1529B.

AMERICA'S FIRST FAMILY OF POLYSTYRENES

GENERAL PURPOSE: STYRON 666 • STYRON 665 (Extrusion)
STYRON 688 (Easy Flow) • STYRON 689 (Easy Flow)
HIGH IMPACT: STYRON 475 • STYRON 429 (Extrusion)

HIGH IMPACT: STYRON 475 • STYRON 429 (Extrusion)
STYRON 777 (Medium Impact) • STYRON 440 (Heat Resistant)
STYRON 480 (Extra High Impact)

HEAT RESISTANT: STYRON 683 . STYRON 700

the complete family of Dow plastics includes ETHOCEL® - PVC RESINS - SARAN - STYREX® - POLYETHYLENE

YOU CAN DEPEND ON



The Plastiscope

produce liquid grades of the resin and the other solid grades.

Previously, the liquid resins were produced alternately with solid grades in other units at the Houston plant. The liquid resins are used as structural plastics (metal-forming tools and dies, glass-laminated parts, and body patches), as corrosion-resistant paints, as metal-to-metal adhesives, etc. Solid grades are used primarily in the surface coating industry.

The DeVilbiss Co., Toledo, Ohio, is constructing a new and larger Los Angeles direct factory branch at E. Slausen and S. Garfield Aves. The company manufactures finishing system components.

Located on a 50,000-sq. ft. site, the new facility, which is five times the size of the present branch, will house sales offices, salesroom, warehouse space, serv-

ice department, rebuilt exchange center, and a customer research laboratory. The latter is patterned after similar facilities at the headquarters plant in Toledo and will be used to conduct tests to solve finishing and equipment problems in the Sales Div. Scheduled for installation for demonstration and customer test purposes will be a complete line of automatic spray machines built by DeVilbiss, as well as exhaust and water wash spray booths. The company's paint heaters and catalytic equipment also are to be included in the research laboratory.

George Fulton will head the Los Angeles branch as manager, working under the direction of J. W. (Pat) Dayton, West Coast district sales manager. D. L. Bohon is West Coast general manager.

Metal & Thermit Corp. has purchased a 163-acre site near Carrollton, Ky., and will soon begin construction of a new chemical processing plant. The initial de-

velopment of the property will cover 10 acres and will include an office building, a warehouse, and a steam plant, as well as production buildings and several minor structures. At the start of operations, the new plant will employ 30 to 35 persons.

The plant will produce organotin chemicals for the plastics, textile, pharmaceutical, and other industries, including a line of color stabilizers and catalysts for plastics.

Popular Plastic Products Corp., E. Northport, N Y., after 12 years of private ownership, will sell, through Lepow Securities Corp., 150,000 shares of the company's Class A stock at \$2.00 a share to the general public. Popular Plastic Products' primary business is custom injection molding. The firm recently entered the proprietary toy field through Dewl Plasti-Toy Corp., a wholly-owned subsidiary. Leonard E. Elterman, president, states that the funds will be used for construction of mold-making facilities, research



plastics scrap...

We pay top prices for all types of plastics scrap and surplus virgin materials. Turn yours into cash.

CUSTOM COMPOUNDING TO YOUR SPECIFICATION

A. BAMBERGER

Processors of Plastics Materials

703 BEDFORD AVE. . BROOKLYN 6, N.Y.

CHICAGO OFFICE

5850 NO. CLARK ST. * Tel: Long Beach 1-0419-20

and new product development, purchase of additional machinery for existing divisions, and contemplated divisions for reinforced plastics and vacuum molding.

The company also announces that Popular Fibreglass Products Corp. has been formed as a wholly-owned subsidiary to engage in the fibrous glass-reinforced plastics molding fieldboth on a custom and a proprietary basis. Products to be custom molded include baby carriages, pool filters, truck parts, safety helmets, duct covers, and freezer tubs. Among the firm's proprietary items will be insulator caps, wading pools, archery bows, light reflectors, battery cases, and engine housings.

Evans Products Co., Plymouth, Mich., has agreed to a plan covering the acquisition of substantially all the assets of Haskelite Mfg. Corp., Grand Rapids, Mich. Haskelite and its subsidiaries manufacture doors, door parts, and laminated wood products. Evans makes fir plywood, lumber, battery separators, hardboard, and other products in five plants in the Northwest. The company also manufactures truck and bus heaters, bicycles, and other velocipedes.

Flexonics Corp., Maywood, Ill., has acquired the Flex-O-Tube Div. of Meridan Corp., Inkster, Mich. Flexonics, founded in 1902, specializes in the production of flexible metal hose, bellows, ducting assemblies, etc. Flex-O-Tube for 29 years has been a manufacturer of flexible plastics and rubber couplings and hydraulic hose assemblies and fittings.

Mel Maurer, Flex-O-Tube president, will continue as chief executive officer of the division.

John F. P. Farrar is president of Flexonics.

Resin Research Laboratories, Inc. has broken ground for a new Resin Research Center at 400 Adams St., Newark, N. J. The new center will consist of eight buildings, one of which will be equipped as a complete radiation laboratory. The other buildings will house laboratories for research and development in resins

Your fast way of pre-determining the weathering qualities of a Plastic is in the ATLAS WEATHER-OMETER

Test for resistance to sunlight, moisture, and thermal shock.

Results are accurate and reliable and can be reproduced precisely over and over again. The Weather-Ometer furnishes a yard stick to measure the improved quality of a plastic

in development and to maintain a standard of quality in production.

Automatic control of light, moisture, and temperature, can be set for repeating cycles according to the test program selected. A year of destructive weathering can be reduced to a few weeks of testing in the Weather-Ometer.

For Color Fastness only use the Atlas Fade-Ometer⁽¹⁾. Fully automatic in operation

Write for technical information and recommendations for your particular problem



ATLAS ELECTRIC DEVICES CO., 4114 N. Ravenswood Ave., Chicago 13, Illinois

WEATHER-OMETERS FADE-OMETERS LAUNDER-OMETERS



... For easy 1-man slitting and convenient location in any job area

SLITS ANY GAUGE TEFLON,* plastic, leatherette, paper, fibre, cellophone, acetate and foil

PLUGS INTO ANY 110 AC light socket

SIZE: 30" x 20" x 20" high

Mfrs. of 25 different models of slitters up to 125", and drum type sheeters

*T.M. DuPont

Now! A BENCH MODEL SLITTER. Small in size for easy location. . . . Big in action for slitting any gauge Teffon* or plastic as narrow as ½". Single rewind principle. Guaranteed against fusing or interleaving. Start and stop switch for easy control of inching. Loads, threads, slits and rewinds from front of machine. Simple controls make tension adjustment easy. Sealed ball bearings eliminate maintenance costs. Takes parent rolls up to 18" wide x 12" diameter with cores from 1½" to 3". Complete with 3-speed change motor.

Write today for details.

DOVEN

MACHINE & ENGINEERING INC.

2706 W Van Buren Street, Chicago 12, III.



"Gentlemen: Please send me..."

It isn't necessary to write an individual letter for every booklet or brochure you want on a plastics subject.

By using the Manufacturers' Literature Page in this magazine, you can join the many readers who regularly ask for and receive the publications distributed by suppliers to the plastics field.

The Manufacturers' Literature Page is easy to locate in this issue, and easy to use. It's printed on heavy colored paper. All you do is circle the items you want, fill in the free reply card and mail.

Take advantage of this free service without further delay. Turn to the Manufacturers' Literature Page now!

A Service of

MODERN PLASTICS

A BRESKIN PUBLICATION

575 Madison Avenue, New York 22, N. Y.

The Plastiscope

and polymers, paint and coatings, adhesives, insulation, corrosion control, rubber, and fabrication. It will have pilot plant equipment, including resin reactors of different types and auxiliary equipment.

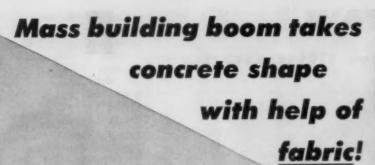
Narmco Resins & Coatings Co., Costa Mesa, Calif., is expanding its facilities for the production of aircraft structural adhesives and laminating materials by the addition of approximately 7000 sq. ft. of factory space and necessary equipment. The new installation, to be erected at a cost of \$225,000, will increase Narmco's capacity for the production of Metlbond structural adhesives and Conolon laminating materials by more than 100 percent. Completion of the facility is expected during the spring of this

Artmore Plastics Corp., 1003 Oldtown Rd., Cumberland, Md., has broken ground for a new plant in Cumberland. The company, headed by Arthur C. Morgan, specializes in sheet forming, decorating, and heat sealing.

L.O.F. Glass Fibers Co. has purchased 75 acres of land in Corona, Calif., 50 miles east of Los Angeles, for plant and warehouse site purposes. Plans for the use of the site are being developed by company engineers.

Automatic Molding Machine Co., manufacturer of Automold fully automatic, high-speed compression molding machines, has moved to its new plant at 3201 Exposition Place, Los Angeles, Calif., occupying an area of about 20,000 sq. feet. George R. Croft is western sales manager.

Makray Mfg. Co., custom plastic molder, has moved to its new quarters at 4400 N. Harlem Ave., Chicago, Ill., a specially designed one-story plant covering 60,000 sq. ft. of manufacturing and warehouse space. The new plant, which consolidates scattered fa-





Final spraying of concrete on pneumatic form

Inflate a balloon cover it with wire mesh -spray with concrete-deflate the balloon and another building is complete. Time: 24 hours! That is the procedure currently being used to build low-cost permanent structures—for storage buildings, hangars, schools, homes and other enclosures-in many parts of the world. The huge pneumatic forms, made of rubberized nylon, are fabricated by the Aviation Products Division of Goodyear Tire and Rubber Company, in shapes which permit the erection of half-barrel, spherical, cylindrical, elongated and semi-spherical buildings, along with straight side-walls and rectangular floor plans. Source for the nylon base fabric: Wellington Sears. Though the neoprene hides the nylon, Wellington Sears is proud to play this supporting role, as it does in so many other cases. This is but one of the long list of base fabrics engineered by Wellington Sears for rubber, neoprene or vinyl coatings. More than likely, our century of experience can be useful to you, in solving your problem. If it involves natural or synthetic fabrics in combination with rubber or plastic, call on Wellington Sears. For informative booklet, "Fabrics Plus," write Dept. K-2.

Wellington Sears
FIRST In Fabrics For Industry

For Coated Materials, High and Low Pressure Laminates and Other Reinforced Plastic Products



Wellington Sears Co., 65 Worth St., New York 13, N. Y. - Atlanta - Boston - Chicago - Dallas - Detroit - Los Angeles - Philadelphia - San Francisco - St. Louis

HARSHAW

cadmium lithopone



HARSHAW

Available in Eleven Brilliant Shades

• YELLOW

• ORANGE • MAROON

For colorful plastics in rich deep tones or delicate pastel tints, use Harshaw cadmium pigments. Their maximum chemical and heat resistance combined with complete insolubility make them excellent colorants for many types of plastics, such as: polystyrene, polyvinyl chloride, cellulose acetate, polyethylene, and methyl methacrylate.

it's yours

Send for color folder showing complete line of Harshaw Cadmium Lithopone Yellows and Reds.

Corresponding shades of concentrated C. P. Cadmium Pigments are also available.

THE HARSHAW CHEMICAL CO.

1945 EAST 97th ST., CLEVELAND 6, OHIO

clip and mail

Send	me	YOUR	Cadmium	Lithopone	Color	Card	

My Name	

Company Name____

Street.

City_____Zone__State___

cilities into one streamlined operation, includes 26 modern highspeed presses and tool and die facilities for the production of precision molds.

Meetings

Plastics groups

February 5-7: The Society of the Plastics Industry, Inc., Twelfth S.P.I. Reinforced Plastics Division Conference, Edgewater Beach Hotel, Chicago, Ill.

March 18-21: The Society of the Plastics Industry, Inc., S.P.I. Annual National Conference, Los Angeles-Biltmore Hotel, Los Angeles, Calif.

March 18-21: The Society of the Plastics Industry, Inc., Pacific Coast Plastics Exposition, Shrine Exposition Hall, Los Angeles, Calif.

April 3: Society of Plastics Engineers, Inc., Regional Technical Conference, New York, N. Y. Subject: "Plastics for Building."

April 4-5: The Society of the Plastics Industry (Canada), Inc., Fifteenth Annual S.P.I. Canadian Conference, Hotel Chateau Laurier, Ottawa, Ont.

Other meetings

March 3-6: American Institute of Chemical Engineers, Meeting, Greenbrier Hotel, White Sulphur Springs, Va.

March 12-13: Chemical Market Research Association, Meeting, Sheraton Hotel, Philadelphia, Pa. Theme: "Our Next Five Years of Competition with Foreign Chemical Industry."

March 25-27: American Society of Tool Engineers, Silver Anniversary Technical Meeting and Conference, Shamrock Hilton Hotel, Houston, Texas.

March 27-28: Commercial Chemical Development Association, Honor Award and Annual Meeting, Statler Hotel, New York, N. Y.

April 8-11: American Management Association, Twenty-sixth National Packaging Exposition, International Amphitheatre, Chicago, Ill.

Companies...People

Union Carbide: Union Carbide Research Institute, formed to engage in basic scientific research, will be located on the firm's Westchester property near Tarrytown, N. Y. Dr. Augustus Kinzel, vice president of research, will administer the Insti-tute. Dr. E. R. Jette, formerly head of the Chemistry and Metallurgy Div. at the Los Alamos Scientific Laboratory, New Mexico, appointed director; his assistants are Dr. S. R. Aspinall, formerly with the U.S. Office of Naval Research, and Dr. A. J. Stosick, formerly chief of the Rockets and Material Div. of the Jet Propulsion Laboratories at the California Institute of Technology. The work at the Institute will complement and extend the basic research now being carried on in the existing research laboratories of Union Carbide. Facilities for the Institute are expected to be completed by the spring of 1958.

*

.

Bakelite Co.: H. F. Robertson, with Union Carbide since 1926, named manager of technical planning and will be concerned primarily with future and long-range technological effort of the Research and the Product and Process Development groups. Dr. C. M. Blair, Jr., formerly superintendent of Carbide and Carbon Chemicals Co., Seadrift, Texas, appointed general manager of polyolefins. R. D. Glenn, former assistant works manager of Carbide and Carbon Chemicals, now general manager of vinyls. J. E. Brister, previously manager of the Molding and Extrusion Dept., named general manager of polystyrene. A. A. Boehm, formerly production superintendent of the Bound Brook, N.J., plant, promoted to general manager of phenolics. Dr. A. W. Downes, formerly associate director of development, made general manager of new resins and compounds. Appointments made at the Bound Brook plant are as follows: Dr. Richard W. Quarles, with the company since 1937, named associate director of the Product and Process Development Laboratories and will be in charge of the Chemical, Physical, Engineering and Process, and Managers' Divs. H. Maxwell Quackenbos, with the firm since 1943, now assistant director of development in charge of the Chemical Div. Warren J. Frissell, with the company since 1948, named a group leader in charge of raw materials in the Product and Process Development Laboratories. Robert E. Byrne appointed a group leader of the Competitive Products group in the Development Laboratories

Carbide and Carbon Chemicals Co.: J. R. Howell, R. W. Lindberg, and Julian Paul named assistant district sales managers for Chicago, Cleveland, and Boston, respectively.

The Dow Chemical Co.: Dr. Edgar C. Britton, retired as director of the Edgar C. Britton Organic Research Laboratory at Midland, Mich., will continue to serve as a research consultant on a company-wide basis. He is succeeded as laboratory director by Dr. Ralph P. Perkins, formerly an assistant director. J. W. Mighton, formerly in charge of the sheet section, promoted to head of the molding section of Plastics Technical Service. He succeeds Gordon B. Thayer, recently named plastics specialist on the PTS staff. Richard J. Lee, formerly customer service engineer in the film section, succeeds Mr. Mighton. G. J. Williams, formerly sales manager of the Textile Fibers Dept., appointed to newly created post of assistant to the sales manager of the Plastics Dept. Succeeding him is Amos L. Ruddock, head of the merchandising section of plastics sales for the past 10 years.

Allied Chemical & Dye Corp.—Barrett Div.: Dr. Maurice H. Bigelow, formerly director of research, appointed technical director, succeeding C. G. Stupp, vice president, who has retired after 40 years' service with the company. Dr. Bigelow, with the firm 25 years, is author of more than 50 technical articles, books, and patents, primarily on plastics. Dr. Werner E. Kleinicke, former director of the Shadyside Applications Research Laboratory, Edgewater, N. J., now director of research.

Semet-Solvay Div.: Frank M. Norton appointed vice president and H. E. Imes director of operations.

National Aniline Div.: Lawrence H. Flett, formerly director of new products and now a consultant to the division, made an honorary member of Societe de Chimie Industrielle.

Celanese Corp. of America: Kenneth C. Loughlin elected to the newly created post of executive vice president. Ronald O. Gilbert, John W. Brooks, and Alexander R. Cochran appointed vice presidents. Mr. Gilbert will continue to serve as secretary of the firm. John W. Brooks also succeeds Mr. Loughlin as general manager of the Textile Div. Alexander R. Cochran will coordinate planning for the company's manufacturing facilities and engineering policies.

Sixteen regional distributors for Marco polyester resins and related products have been appointed in order to expedite service to smaller customers. They will fill most resin orders of less than one drum. Larger orders will continue to be handled directly from Celanese' Linden, N. J., shipping center.

Du Pont: Robert C. Myers appointed manager of packaging sales of the Film Dept., succeeding the late Warren J. Harte. William B. Davis, assistant industrial sales manager since 1952, succeeds Mr. Myers as industrial sales manager. The Film Dept. has also established two new industrial sales districts. Carl H. Schreep will manage the western district, with headquarters in Chicago, assisted by Thomas C. Gibson. Ronald C. Davis named eastern manager, with headquarters in New York City, will be assisted by Lockhard T. Hicks. J. T. Axon succeeds Mr. Davis as southern district manager of packaging sales; Neale A. Gow replaces Mr. Axon as assistant manager of packaging sales for the eastern district.

Monsanto Chemical Co.—Plastics Div.: Robert J. Schatz, associate director of research at Springfield, Mass., promoted to associate director of research at the division's Texas City, Texas, laboratory. He will be succeeded by R. I. Dunlap, assistant director of research. Gordon H. Lovett appointed technologist in the division's Engineering Dept. at Texas City. (The position of technologist at Monsanto is one which allows acientific personnel to progress to maximum levels within the company without having to engage in administrative activities.)

istrative activities.)

Research and Engineering Div.:
Dr. Ferdinand C. Meyer named associate director of research in the Central Research Dept. Dr. Tracy M. Patrick, Jr. named assistant director of research.

Minnesota Mining & Mfg. Co.:—Industrial Tape Div.: James B. Gergen, former supervisor of new product development, promoted to assistant manager for new products of the Research and Business Dept.; he will be concerned with product development, field evaluation, and early promotional work on 3M's new Scotchpak heat-sealable polyester films, as well as new industrial pressure-sensitive tape products. Richard T. Flaherty appointed supervisor for Scotchpak films of the Products Control Dept.; he will direct product control, development, and technical service operations.

Reinforced Plastics Div.: Victor

Reinforced Plastics Div.: Victor H. Colson named merchandising manager of the division; he will be responsible for the merchandising of Scotchply reinforced plastics and 3M reinforced plastic pipe.

Plax Corp.: American Sisalkraft Corp., Attleboro, Mass., has been named exclusive distributor in the construction field of Polyflex 230, a clear, oriented styrene-acryloni-

Companies...People

trile copolymer sheet material produced by Plax as a replacement for glass in outdoor applications such as greenhouses, porch enclosures, etc. X. S. Smith, Inc., Eatontown, N. J., named distributor of the material in the floricultural and horticultural fields.

A. K. Thorn, formerly manager of the American Management Association's Packaging Div., named western regional sales manager for Plax.

The Kendall Co., Bauer & Black Div.: George C. Stineback, general sales manager of Polyken Industrial Tapes, promoted to director of sales of the Chicago Div. He will be responsible for all marketing operations of Polyken, Bauer & Black, Bike Web, Blue-Jay, Andrews-Alderfer, and Bauer & Black International, which comprise the Chicago Div. of Kendall. Before taking over the sales operation of Polyken, Mr. Stineback was sales manager of The Kendall Co. (Canada) Ltd. Jay Hodges, who has been associated with Polyken for several years, and for the past three years as field sales manager, succeeds Mr. Stineback as general sales manager. The company's latest contribution has been the development of Polyken protective coating for the wrapping of underground pipe as a corrosion preventative. Polyken was recently used to wrap a 122-mile 22-in. pipe line from Defiance, Ohio, to Bridgman, Mich.

Archer-Daniels-Midland Co., Minneapolis, Minn., has purchased an interest in Scado Kunstharsindustrie, N V, The Netherlands, which is now known as Scado-Archer-Daniels, N V. ADM also has licensed Scado to use its formulas and know-how in the manufacture of ADM resins, copolymers, and plasticizers. The European company will serve primarily The Netherlands and Belgium but also will engage in export marketing. Scado produces plasticizers, phenolic resins for molding powder, alkyd, urea, and other resins for paint.

Sun Tube Corp.: Claude L. Alexander appointed general sales manager. W. D. McDonald named vice president in charge of sales of Eun Tube Corp. of Canada, Ltd., a subsidiary. Sun Tube, specializing in collapsible metal tubes, impact extrusions, and aerosol valves, also injection molds polyethylene caps and may soon start extruding polyethylene.

Sommers Plastics Co., 7 W. 18th St., New York, N. Y., appointed exclusive Textileather-Forrest Process materials distributor and sales representative serving manufacturers of handbags, wallets, belts, advertising specialties, and novelties by The General Tire & Rubber Co.'s Textileather Div., Toledo, Ohio. Textileather-Forrest Process materials are embossed vinyl films. Sommers also holds the distributorship for General Tire Resproid vinyl and Lion Products' line of vinyls with special finishes and effect.

Baldwin Lima Hamilton Corp.— Hamilton Div.: Alfred L. Stoops appointed press sales engineer at the Cleveland office. Clarence A. Cheney, with the company 30 years, named office manager and inside sales representative of the new Detroit office; Carl R. Viars, formerly press service manager of the Hamilton, Ohio, plant, now a press salesman.

Lynd-Farquhar Co., Boston, Mass., appointed New England dealer for the division's mechanical, hydraulic, and compacting presses. Mochlenpah Engineering, Inc., 1315 S. Vandeventer Ave., St. Louis, Mo., named a dealer for six midwest states.

General Mills, Inc.: Dr. Donald H. Wheeler, with the company since 1943, appointed head of the Chemical Research Dept. of the Research Laboratory. Dr. J. William Haun, formerly with Monsanto Chemical Co., has joined the research staff as head of the Chemical Engineering Dept.

Weiss & Klau, Inc. has been appointed national distributor of Quilted Hartex, Harte & Co.'s self-adhesive quilted vinyl fabric. The new distributor will handle the full line of Quilted Hartex, which includes 11 new patterns, in 26 color combinations, 18 in. wide, to retail at \$1.00 a yard. It will be available to chain and variety stores, department and hardware stores, and notion shops.

Quilted Hartex, made of Harte's Wataseal vinyl film, is electronically quilted with virgin cotton batting, with a backing of another sheet of plastic, completely waterproof and durable. It is recommended as a decorative and protective covering for walls, closets, headboards, cabinets, and trimmings.

Cadillac Plastic & Chemical Co., Detroit, Mich., appointed distributor for Raybestos-Manhattan, Inc. (Teflon sheets, rods, tubes, tapes and strips, and cementable Teflon sheets and tapes); Chicago Molded Products Co. (Campco rubber-modified styrene sheets and linear polyethylene sheets); Wasco Products, Inc. (Acrylite decorative cast acrylic sheets with embedded natural tex-

tures); and Sigma Specialty Chemicals (MEK methyl ethyl ketone, peroxide catalysts for cold-setting of polyester and vinyl resins).

Whitehead Metal Products Co., Inc., New York, N. Y., has been appointed by Seiberling Rubber Co. as a distributor of Seilon rigid polyvinyl chloride for corrosion-resistant applications. Whitehead will sell the material in sheets, plates, and extruded welding rods.

General Electric Co., Silicone Products Dept.: Milton C. Lauenstein named manager of the Chicago sales district and Robert T. Daily manager of the western sales district. Both districts are newly created.

McKesson & Robbins, Inc., Chemical Dept.: A new east central district office has been established at 4500 Euclid Ave., Cleveland, Ohio, with Robert D. Shaw as manager. Branch warehouses and sales offices will be maintained in Toledo, Detroit, and Pittsburgh, as well as in Cleveland. The department distributes a line of peroxide catalysts and other chemicals.

Heresite & Chemical Co.: Earl W. Haugh, formerly associated with the company from 1944 through 1950, has returned to Heresite as vice president and director of sales. Rudolph Stockinger promoted to assistant production manager and Otto Kollath to superintendent of the Chemical Dept.

Sherman Rubber Machinery Co., a new division of Botwinik Brothers of Mass., Inc., Worcester, Mass., has started operation under the direction of John R. Busser. The firm offers new, used, and rebuilt plastics and rubber processing machinery and will manufacture special machinery to specification.

Stauffer Chemical Co.: Irwin F. Smith now industrial engineer at the Molded Products Div., Los Angeles, Calif. Wyman L. Taylor named administrative assistant to the vice president, Pacific Coast. William H. Oliver named northern California sales manager, replacing Mr. Taylor.

Rohm & Haas Co.: Robert G. Myers transferred from Chicago office to Dallas office as sales representative for the southwest territory; Charles B. Pyle transferred from the Philadelphia sales development office to Chicago office as sales representative to cover Illinois, Indiana, and Michigan.

Frank & Sadev Co., 350 Fifth Ave., New York, N. Y., appointed sales agent for the Sanitized Process for the Plastics and Rubber Div., Sanitized Sales Co. of America. Harold Sadev will coordinate his company's activities with those of Sanitized

IS BLACK A COLOR?

Strictly speaking no, yet ADP frequently is called upon to match a certain shade of black. Can we do it?

Of course ... black or any other color ... because color dispersions are our business.

Matching shade is only the beginning. Because ADP dispersions are colloidal in nature, they remain uniform throughout the compound . . . and a little goes much further than ordinary mixtures. So your end product is better and costs less, too. And when you re-order, you will get the same shade, same uniformity, same economy.

Instead of wrestling with costly dispersion problems yourself or putting up with ordinary mixtures produced by other methods, call in an ADP specialist.

He will work closely with you on an individual basis.

Your business is plastics...ours is controlled dispersions...any color, and black.

*controlled colors by

ACHESON DISPERSED PIGMENTS CO.

MORRIS BUILDING, PHILADELPHIA 2, PA.

A UNIT OF ACHESON INDUSTRIES, INC.

West Coast Distributor: B. E. Dougherty Co., Los Angeles 21, California In Europe: ACHESON COLLOIDS LTD., 18 Pall Mall, London, S.W.1, England

*Because ADP dispersions are colloidal in nature, with pigment particles of microscopic size



In this application, the metal detector is so arranged that detection of metal (chiefly broken needles), in resin-impregnated sheeting, automatically stops the movement of the material. As the product travels through the inspection "eye," provision is made for the automatic marking of the portion containing metal. Not only has elimination of tramp metal saved thousands of dollars annually by protecting molder dies, but it has also improved quality.

Why chance damaging costly molder dies, calenders and other machinery with unsuspected tramp metal? You can protect against both magnetic and non-magnetic metals, at any stage of manufacture, with the RCA Electronic Metal Detector.

In many plants, the Metal Detector is also used to check on other machinery. Parts that are deteriorating can be replaced, or equipment overhauled. Once installed in your plant, you'll be surprised how quickly the Detector pays for itself! Ask about installation supervision and service facilities of the RCA Service Company.

RCA... the World's Best Name for QUALITY



RADIO CORPORATION of AMERICA

CAMDEN, N. J.

In Canada: RCA VICTOR Company Limited, Montreal

Dept. 0-7!	Building 15-1,	Camdon, N. J.	
		me complete information Electronic Metal Detector.	
NAME		TITLE	

Get New Data on all 3 Infrared Heating Units!

Fostoria Oven Sections for NEAR-INFRARED LAMPS

Fostoria Oven Sections for NEW RADIANT RODS

Fostoria Öven Sections for NEW T-3 QUARTZ LAMPS

Get New Bulletins Now!



Whether you select components or complete ovens for swift, safe, sure processing... your one source of radiant equipment for all three sources of infrared heat is the pioneer manufacturer... Fostoria. Get better acquainted with this modern low-cost way to heat, dry, cure, bake and finish products, materials and parts. Write now and ask for "All 3 Infrared Bulletins," Address:

FOSTORIA PRESSED STEEL CORPORATION Dept. 231 Fostoria, Ohio



FERRHARY 1957

Sales Co., 181 Madison Ave., New York, N. Y., exclusive distributor for the process.

Sanitized is a hygienic finish which is said to inhibit the growth of bacteria and retard the development of mold, mildew, and perspiration odors. The company claims that it will act on any fibroid materials and has been successfully incorporated in plastics and rubber.

Enjay Co., Inc.: J. P. Haworth, formerly assistant sales manager of the Butyl Div., named manager of newly created Eastern Sales Div. H. C. Evans appointed Akron district manager, reporting to Mr. Haworth. W. H. Peterson is new sales manager of the Butyl Div.; P. C. Richards named sales manager of the Alcohols and Chemicals Div. and K. J. Nelson appointed manager of a new Special Accounts Div. which will handle long-term contracts or agreements with major chemical firms for products used as chemical raw materials.

Middletown Rubber Corp., Middletown, Conn., has established the Plastic Specialties Div. which will merchandise vinyl-coated fabrics to the handbag, luggage, automotive seat cover, apparel, upholstery, and novelty trades. Morey Weisman appointed sales manager of the new division.

Columbian Carbon Co., manufacturer of carbon blacks, has moved its Akron headquarters to its new building at 452 E. Market St., Akron, Ohio.

The Vichek Tool Co.: Donald R. Butler, with the company over seven years, named manager of the Plastics Div. Carl Towne, with the firm 15 years, appointed assistant super-intendent of plastics production.

A. Schulman, Inc. has established a West Coast office at 1127 Wilshire Blvd., Los Angeles, Calif., under the supervision of Frank M. Francis, vice president in charge of the West Coast division. Mr. Francis has been associated with the company for 22 years.

Plastic Molders Supply Co., Inc., supplier of dry colorants to injection molders, has opened a new branch at 1730 Columbus Ave., Sandusky, Ohio.

Thermo Electric Co., Inc., Saddle Brook, N. J., manufacturer of pyrometric temperature measuring equipment, has established regional sales offices at 6322 Cicero Ave., Chicago, Ill., and Attleboro, Mass. D. G. Reinken will manage the Chicago office; George E. Fredette, sales



COMONOMERS

Unsaturated diesters of high purity available in commercial quantities for use as...

- * Internal plasticizers for polyvinyl acetate
- * Synthetic lubricants and oil additives
- * Comonomers in polymerization reactions
- * Synthetic detergent intermediates

DIOF Di-iso-octyl Fumarate DOF Di-2-ethyl hexyl Fumarate DBF Dibutyl Fumarate DIOM Di-iso-octyl Maleate'
DOM Di-2-ethyl hexyl Maleate
DBM Dibutyl Maleate

Special comonomers available on request

WRITE FOR SAMPLES! We'll send you a brochure on all RC products that can speed your operations, improve your products.

RUBBER CORPORATION OF AMERICA

Ready . . . reliable . . . RC serving American industry, since 1930

New South Road, Hicksville 1, N. Y.
Sales Offices: NEW YORK • ALKON • CHICAGO • BOSTON

PLASTIC SHEET GLAZER

Glazed plastic sheets vacuum form more readily than laminated sheets have greater strength than nonglazed sheets.

This Goulding unit produces glazed sheets that retain gloss finish after vacuum forming, without impairing physical properties.

Upper section of unit contains heating elements arranged to supply heat in sufficient intensity to flow the top surface only, producing the gloss finish.

Equipped with adjustable speed, worm driven, stainless steel rollers,



15 HP motor; open or closed circuit water cooling system with reservoir tank, pump and water for delivering 12 GPM, thermostatic valve water temperature control.

Unit is built in various sizes to suit individual requirements. Sample sheets, prices, and delivery by request.

Other Goulding plastics equipment includes hopper-drier,

hydraulic presses, sheeting dies.



Write for literature containing

complete specifications.

MANUFACTURING CO.

River at Ortman Street Saginaw, Michigan

5

.

Companies...People

engineer, will cover most of New England from the Attleboro office. Arobone & Cline, 3344 Lancaster Ave., Philadelphia, Pa., appointed to represent Thermo Electric in Delaware, Maryland, Virginia, and Washington, D. C.; part of southern New Jersey, eastern Pennsylvania, and northeastern West Virginia.

F. G. Ludwig, Inc., Old Saybrook, Conn., has purchased Gull Reinforced Plastics. Ludwig manufactures copying, printing, and visual aids equipment. Through the purchase, Gull will be reactivated to manufacture plastic products similar to those manufactured by them prior to the sale of the company. John Newman, formerly secretary of Gull, is being retained to reactivate the business, which will be located in Old Saybrook.

The Glastic Corp., Cleveland, Ohio, manufacturer of glass-reinforced plastic electrical insulation has opened a new regional sales office at 3405 N. Harlem Ave., Chicago, Ill. George F. Fratto is in charge of the office, assisted by Martin H. Best.

Baird Chemical Corp., New York, N. Y., appointed sales representative for Cellofilm Industries, Inc., Woodridge, N. J., manufacturer of nitrocellulose-base solutions.

Antenavision Plastics, formerly known as Gay Novelties Mfr. Co., Clifton, N. J., has moved to 256 Harrison Ave., Lodi, N. J. The company vacuum forms specialty items. P. D. Dedezzio is president.

Avery Adhesive Label Corp.: R. S. Avery elected to newly created post of chairman of the board. Russell Smith succeeds Mr. Avery as president.

Raymond G. Spain, formerly of the General Motors Technical Center, now with Wyandotte Chemicals, Wyandotte, Mich., where he will specialize in research and development of new elastomeric materials in which the company is working in cooperation with the Department of Defense.

Dr. George A. Hawkins, dean of engineering, Purdue University, elected a member of the Research Fund Committee of American Society of Tool Engineers. A primary responsibility will be to aid in the development of ar intensive research program on "Properties of Plastics Used for Tooling Applications" now under way at the Purdue Research Foundation under the direction of Pro-

fessor O. D. Lascoe. The committee is headed by James R. Weaver, works manager at the East Springfield, Mass., plant of Westinghouse Electric Corp.

John A. Meima, with the company since 1948, promoted to the newly created post of technical service manager of the Foundry Dept. of The Borden Co.'s Chemical Div. He will specialize in urea and phenolic resins for binding sand cores and shell molds.

Richard T. Yates, formerly manager of the Agricultural Chemicals Div., Naval Stores Dept., elected president of Hawthorn Chemical Co., a new company formed by Hercules Powder Co., Inc. and Imperial Chemical Industries, Ltd. Hawthorn will build and operate an \$11 million, 35 million-lb. capacity plant for the manufacture of methyl methacrylate at Louisiana, Mo., adjoining the Missouri Ammonia Works, owned and operated by Hercules.

Henry M. Haase elected vice president in charge of engineering and research of Borg-Warner Corp., Chicago, Ill. Mr. Haase will direct the firm's expanding program of product planning and engineering research and development, including general supervision over the newly built Borg-Warner Research Center in Des Plaines, Ill., and the Petro-Mechanics Research Div. in Los Angeles, Calif.

John Marco, formerly president of Marco Co., Inc., now president of Marco Development Co., Inc., Wilmington, Del. Marco Development will be active in continuous production equipment design. Its principal line is continuous laboratory size reactors and mixers in addition to its commercial equipment.

Harry A. Fedderson appointed technical director of Loven Chemical of California. The company produces a complete line of phenolic molding powders, as well as liquid and solid industrial resins and specialty resin cements.

John Rabuse, with the firm since 1945, appointed assistant to the president of Heli-Coil Corp., Danbury, Conn.

Solomon Elmasian, formerly plant chemist of Plastic Film Corp., now president and treasurer of Floatex, Inc., Berlin, Conn. The company is a processor of unicellular vinyl foam material in cylindrical shapes up to 5 in. in diameter, and 70-in. lengths.

Floatex plans to offer unicellular sheet stock from %-in. thickness up, by 70-in. width, in the very near

Daniel D. Lewis now in charge of sales and marketing for Tiger Plastics Corp., 307 Richardson St., Brooklyn, N. Y. The company specializes in low-pressure and vacuum forming of thermoplastic sheeting for lighting and industrial applications.

E. Russell Ashley elected executive vice president and director of Electromold Corp., Trenton, N. J., manufacturer of electroformed molds for the plastics industry. Mr. Ashley will direct the administrative and sales functions of the firm.

R. M. Ladd, formerly with Dominion Color & Chemical Co., Toronto, Ont., joined Kentucky Color & Chemical, Louisville, Ky., as director of research and development.

Donald H. Getz has joined the Technical Dept. of Polymer Chemicals Div., W. R. Grace & Co., as a senior process engineer, with headquarters at Clifton, N. J.

Leonard J. Edwards appointed manager of W. S. Rockwell Co.'s Furnace and Oven Div., Fairfield, Conn., manufacturer of drying and heating equipment.

Glen A. Nelson transferred to Teterboro sales office of Sylvania Electric Products, Inc. as field sales engineer for the company's Parts Div.

Richard E. Dunning elected vice president in charge of manufacturing of Logo, Inc., Chicago, Ill., producer of industrial finishes.

Allen Jones named sales manager of Glass Yarns & Deeside Fabrics, Ltd., Kingsway, London, England. The firm manufactures chopped strand mat, deeformat, and glass rovings.

Richard L. Loeffler named assistant manager of the Marketing Research Dept. of L.O.F. Glass Fibers Co., Toledo, Ohio.

Dr. Thomas G. Fox, head of the polymers research laboratory of Rohm & Haas Co., elected chairman of the American Chemical Society's Div. of Polymer Chemistry for 1957.

Joseph A. Oliva promoted from assistant to general sales manager of Banner Plastics Corp., Paterson, N. J. Banner is a proprietary injection molder of toys and novelties.

John A. Jackson, consulting sales engineer, has opened offices at 117 N. Montgomery St., Trenton, N. J., to offer design service and technical advice on custom molded or extruded applications for plastic, rub-(to page 262)



POLYETHYLENE PROCESSING TIPS

Vol. 11, No. 1

1

4

WITH MORE TYPES THAN EVER, HERE'S HELP IN CHOOSING THE RIGHT POLYETHYLENE FOR YOU

In the last year polyethylene has become a whole family of resins with a wide range of properties

anning or resins with a wide range or properties and many new use possibilities.

Today manufacturers are learning how to tailor polyethylene to almost any end use and processing condition by varying three basic characteristics of the resin in the original manufacturing process:

- (1) Density
 (2) Molecular Weight
 (3) Molecular Weight Distribution

The properties of polyethylene, whether made The properties of polyethylene, whether made by a high pressure, modified high pressure, or any of the low pressure processes are fixed by any of the fow pressure processes are used by all three of these characteristics. An extremely large number of resins having markedly different properties can be produced by controlling these

The processor can usually describe the propfundamental characteristics. erties he needs and the manufacturer can then determine which resin is most likely to fill the bill. From that point the two can work together to determine the "idea!" resin for the application. The following chart shows in very general

terms how some of the polymer properties are affected as these characteristics are varied.

Figure 1: How Properties Change With Molecular Characteristics

Stiffness Tensile Yield Point Film Brittleness Softening Point Low Temperature Britteness Resistance to Environmental Stress Cracking Demsity Increases slightly little or no effect decreases increases increases decreases increases increases decreases increases inc	TOTAL OF		MARACTERIST	M.W.Dist.
Tear Strength decreases increases	Tensile Yield Point Film Brittleness Softening Point Low Temperature Brittleness Resistance to Environmental Stress Cracking Permeability	Increases	Mol. Williams increases slightly little or no effect decreases increases decreases increases	increases slightly little or no effect increases decreases increases little or no effect

Effects of Density Variations

The term density describes the weight per unit the term density describes the weight per unit volume of the resin, and is influenced by the amount of branching in the molecule. Densities

The effect of density variations on polyethylene properties will be discussed completely in the next issue of "Polyethylene Processing Tips". can range from 0.910 to 0.965. You may receive your copy by mail simply by requesting it.

Effects of Molecular Weight

The term molecular weight when applied to polyethylene describes the average or mean size

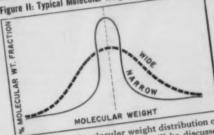
Melt index has been used to indicate molecuof the molecules in the resin. lar weight in the past, but since it is also affected by the degree of branching of the molecules, it is a close, but not a completely reliable cuies, it is a close, out not a completely remote guide. In these discussions, therefore, we will refer guide. If these discussions, therefore, we will refer to molecular weight rather than to melt index.

The effect of molecular weight variations on polyethylene properties will be discussed completely in a future sue of "Polyethylene Processing Tips".

Effects of M.W. Distribution

Distribution is determined by measuring how many of each size of molecule is present. When the percentage of each size of molecule is present. When the percentage of each size of molecule is plotted against molecular weight, a distribution curve similar to the one shown below is obtained. The shape of the curve for each resin tells whether the distribution is wide or narrow.

Figure II: Typical Molecular Weight Distribution Curves



The effect of molecular weight distribution on the properties of polyethylene will be discussed completely in a future issue of "Polyethylene Processing Tips".

U.S.I. Offers Technical Assistance

By indicating density, molecular weight and molecular weight distribution or preferably by indicating the properties you want in your by indicating the properties you want in your fabricated polyethylene product — you will be able to obtain from U.S.I. a polyethylene resin ante to obtain from U.S.I. a polyetnylene resin specific to your end use. Our technical service engineers will be glad to discuss your requirements with you.



DUSTRIAL CHEMICALS CO. Division of National Distillers **Products Corporation**

99 Park Avenue, New York 16, N.Y. Branches in principal cities How to give your plastics the beauty of

PEARL



with ACRO

> Incorporated into any thermoplastic resin, or as a coating on any plastic, Nacromer adds a distinctive pearl-like lustre to any product at amazingly low cost. Either method produces excellent results unique effects impossible to achieve any other way.

> Incorporated into the plastic itself (polystyrene, polyethylene, polyesters, acetates, vinyls, etc.) Nacromer provides a pearlized effect with no changes required in your usual molding or casting process. Nacromer is easily mixed into your plastic by hand, in a Banbury, or on the rolls . . . or your compounder can supply you with ready-mixed resins containing Nacromer.

> As a coating, you merely add Nacromer to your present coating material and apply by your usual method (spray, brush, or dip). No additional finishing operations are required. The addition of transparent dyes makes possible unlimited colors and effects.

> Either way you use it, Nacromer will make an immediate improvement in the sales appeal of your products. Mail the coupon below for more complete information and demonstration samples.

THE MEARL CORP., 147 Waverly Place . New York 14, N. Y.

Please send more information about Nacromer.

■ We want to incorporate it into ■ We want to use it as a coating.

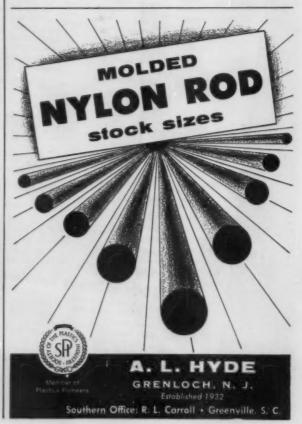
From the World's **Largest Production Unit**

Unrestricted quantities delivered within 24 hours to points in Middle Atlantic and New England areas. Write, wire or phone your requirements for Formaldehyde 37% Low Methanol (Uninhibited); Formaldehyde 37% Inhibited; Hexamine Technical, Powder or Granular.

Merck & Co., Inc.



MERCK & CO., INC. CHEMICAL DIVISION



0

NOW-improve your molding production!

WITH THE SENSATIONAL NEW

DE MATTIA SERIES M

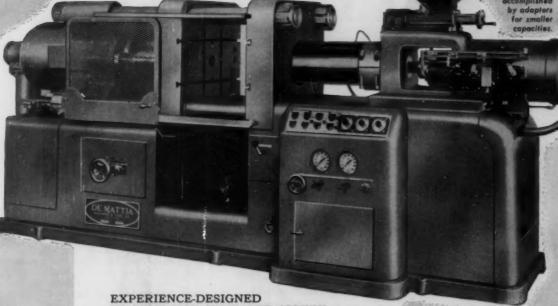
MOLDING MACHINES **IMPROVED**

DESIGN

FULLY HYDRAULIC **OPERATION**

UP TO 6 CYCLES PER MINUTE*

16 OUNCES BY AUTOMATIC PRE-PACKING



TO SAVE YOU TIME AND MONEY

the new Model M Molding Machines are another step forward in molding production. These high efficiency injection machines help you meet competition... are expressly designed to increase your molding production and cut your molding costs. Series M machines offer fully hydraulic operation, up to 6 cycles per minute on smaller shots and shots up to 16 ounces by means of automatic pre-packing!

Available in 8 and 12 oz. Models. The De Mattia Line also includes 4 oz. Verticals, 4 oz. Horizontals and Various Models of Scrap Grinders. Write for Illustrated Bulletins.

DE MATTIA MACHINE and TOOL CO.

CLIFTON, N. J. . N. Y. Sales Office: 50 Church St. . Cable Address: Bromach, N. Y.

DE MATTIA MACHINE and TOOL CO

So quick, so easy...

Even your errand boy gets sure, perfect coloring jobs done with Drycol!

It works like magic because years of development are behind Drycol...this easy one-shot unit packagets coloring method that works perfectly—every time—in your own plant, is a combination of formulated pigments that gives good results.

You get a top-quality coloring job too! Pigments are the same time-tested ones used in compounded thermoplastics you buy already colored—they're light-stable, heat-resistant, dust-free...carefully color-matched, unit packaged by Gering to save worries for you. There's no weighing, no messing—Gering Drycol works perfectly every time.

Drycol helps you produce special colored orders in a hurry, cuts your inventory on colored plastics...and saves you money in the bargain! Immediate shipment on all standard colors.

Blend-Eze, Gering's specially developed wetting agent, can be supplied with DRYCOL to give superior color dispersion and eliminate dusting.

Drycol is also available in special tinsel, metallic, and pearl effects. It would pay you to check with our technical service department.

DRYCOL

the one-shot plastic coloring

GERING PRODUCTS, INC. KENILWORTH, N.

Pioneers in modern plastics for over 30 years!

Companies ... People

ber, and silicone materials. Initially, the firm will be the mid-eastern representative of Goshen Rubber Co., Inc., Goshen, Ind.; The Sperry Rubber & Plastics Co., Brookville, Ind.; and Syracuse Rubber Products Co., Inc., Syracuse, Ind.

Walter H. Loewy now in charge of the Chemical Research Laboratory of Kleen-Stik Products, Inc., Chicago, Ill. The company produces pressure-sensitive adhesives for the printing and advertising industries.

Ronald W. Schmidt has joined the field sales staff of F. J. Stokes Corp., assigned to the Union, N. J., district office.

Dr. Steven J. Assony assigned to the Polyrubber Program of American Latex Products Corp., Hawthorne, Calif. Dr. Assony will be in charge of research and development of polyurethane as a replacement for synthetic rubber in many industrial applications.

Wesley M. Hague, Jr. appointed to head the New England district sales office of Eric Resistor Corp.'s Electronics, Electro-Mechanical, and Plastics Divs.

C. Joseph Mishler appointed Koroseal upholstery sales representative for B. F. Goodrich in the High Point, N. C., area.

John A. Hall now Chicago packaging films representative for Goodyear Tire & Rubber Co.'s Films and Flooring Div.

John K. May, production superintendent, promoted to vice president in charge of manufacturing of Prophy-lac-tic Brush Co., Florence, Mass. Mr. May will be responsible for the supervision of all production, maintenance, and engineering activities of both the Brush and Prolon Plastics Divs.

Dr. Edward F. Wagner appointed to the newly created position of manager of development of Witco Chemical Co., 122 E. 42nd St., New York, N. Y. Dr. Wagner will develop and carry out an over-all program designed to broaden the manufacturing activities of Witco and its whollyowned subsidiaries, Emulsol Chemical Corp., Chicago, Ill., and Ultra Chemical Works, Paterson, N. J.

I. David Easton, formerly vice president of Patchogue Plymouth Corp., has joined Augusta Plastics, Inc., 3820 Boston Post Rd., Bronx, N. Y., injection molder. Mr. Easton will assist Stanley Sapery, president, in sales and development of new items.

0

For products that demand

Iroytuf Orlon* and Dacron* reinforcing blankets

Troytuf Orlon* and Dacron* Reinforcing Blankets—extra strong and light weight—are ideally suited for a wide range of laminating and molding applications. A special needle punching operation tightly interlocks the fibres to form easily handled blankets with excellent deep drawing, dielectric and machining qualities.

Some reasons why so many uses have been found for Troytuf Orlon* and Dacron*:

- better abrasion resistance
- improved electrical properties, even when wet
- no resin-rich corners—more uniform fiber loading
- a surface or laminate with better resistance to mineral acids
- · elimination of preforming
- a safer material for food or drug handling machinery or containers
- a smoother, better-appearing finish
- a better formability after curing
- low moisture absorption
- weatherability



Here are just two widely different uses of Troytuf reinforcing materials—applications that demonstrate Troytuf's versatility and adaptability:

BOAT BODIES

The "Erie," elite 15'7" outboard runabout produced by the Molded Fiber Glass Boat Company, presents molded fiber glass with an outer layer of Troytuf Orlon* integrally joined with the sleek lapstrake hull. The boat is tough, durable and beautiful. Other models made of Troytuf Orlon* are available, too.

HOSPITAL UTENSILS AND FOOD HANDLING EQUIPMENT

Armed services medical branches are currently testing a line of hospital utensils—bowls, trays, bedpans—made of fiberglass preforms with Troytuf Dacron* reinforcing on both sides. Result: smooth surfaced, strong utensils that are abrasion resistant, stain proof, and immune to most corrosive chemicals. These utensils must be sterilized and be able to stand up under the terrific heat and moisture generated in autoclaves. These same qualities are ideal for food handling equipment. Molded Fiberglass Tray Co. of Linesville, Pa., is now manufacturing laminates using this construction.

See for yourself. Send for full particulars and for samples of Troytuf Orlon* and Dacron*, without obligation.

Troytuf

Troy Blanket Mills, 200 Madison Ave., New York 16, N. Y.

Ou Pont registered trademark

1)

Classified Advertisement

Modern Plastics reserves the right to accept, reject or censor classified copy.

Employment

Business opportunities

Equipment

Used or resale only

Machinery and equipment for sale

FOR SALE: Marco Process consisting of Homogenizer, Roto-Feed Mixers. Reactors, Kom-Bi-Nators and pumps, all stainless steel. Heavy Duty Double Arm Sigma Blade Mixers. (2) W & P 50 gal. and 100 gal; (4) J. H. Day 5, 50, 75, 200 gal. stainless steel. (2) Kux Rotary Pellet Presses. (3) Horizontal Ribbon Mixers 336 cu. ft. (12,000#) capacity. Stainless Steel Reactors or Autoclaves—1420 gal., 465 gal., 1 gal. (1) St. St. Pug Mill 7" diameter x 3'9 gal. (1) St. St. Pug Mill T diameter x 3'5' long overiapping chambers, Jacketed 75' c. (3) Mikro Pulverizers #2TH, #3TH. (3) Fitzpatrick Stainless Steel Comminuting Machines, Models D, K & F. Vacuum Shelf Dryers 85-475 sq. ft. We Buy Your Surplus Equipment. Perry Equipment Corp., 1429 N. 6th St., Phila. 22, Pa.

OR SALE: Sand Blasting Cabinets and Blasting Tanks, Dust Collectors, Air Compressors, Spray Booths, all makes and sizes. M. Elstein, 426 Grand St., Jer-sey City 2, New Jersey.

SPECIAL NEW YEAR SALE: New cu tom built Hi-Lo Power Units. 71/2 H.P. Motor 1200 RPM on 75 Gallon Reservoir, Motor 1200 RPM on 75 Gallon Reservoir, 30 GPM Vol. 3 GPM @ 3000 PSI, with Cooler and All Controls \$1500 Guaranteed: other Models to Requirements. (3) HPM 200 Ton Presses. 24"x30" area. 14" Stroke 28" DLO. (2) Watson Stillman Self-Cont. Molding, Transfer Cyls, can be Mounted. 1000 Ton Southwark 64"x64" clear between Columns. 24" Str. 80 DLO. Others on listing avail. on inquiry: Various Pumps in stock for Short Delivery, for any operation. For Presses and Pumps that last, consult us first. Hydraulics Industrial Service, J. F. O'Connor & Son Prop., Renfrew Ave., Elmont, N. Y.

FOR SALE: Cutters, Rotary, Plastic: Leominster Model "O" 1 H.P. M.D.; De-Mattia No. 1 with 5 H.P. M.D.

Die Casting Machine: Loch Engineering, Zinc, Motor Drive 10 H.P.

Extruders: NRM 1½" Elec. Htd. Wire Coating, Payoff and Takeup; 1½" Elec. Htd. Laboratory Extruder 2 H.P Vari-Drive; Royle No. 1, 2" Screw 15 H.P MD; Hartig 2" Elec. Htd. 7½" H.P Reliance V-S Drive 98% New; Royle No. 1, 3 Stage Oil Heated, Excellent Condition; Hartig 3½ Elec. Htd. 45" Barrel 20 H.P Reliance Oil Heated, Excellent Condition; Hartig 3½ Elec. Htd. 45" Barrel 20 HP Reliance V-S Drive; No. 2 Royle 15 HP Motor. 3-½" Screw. Elec. Htd. Die Head; 4 Zone. Elec. Htd., 4" Screw. 80" Barrel, Practically New; No. 3 Royle 30 HP Motor Drive, 4½" Screw. Side Delivery. Q.O. Head; Adamson 6". 4 Speeds 40 HP MD. Strainer Head; Allen Williams 6" Pelletizing Head 60 HP MD. Injection Molding Machines: 1 oz. Van Dorn Model H-200; 2 oz. HPM 54 Clamp 22 Ton, Injection 12 Ton, Manual Con-

trols; 2 oz. NRK Manually Operated Lab Type; 2 oz. Watson-Stillman, Frame 6 oz. Cap., Motor Drive 20 HP, 1945; 2 oz. Van Dorn Oversize Cylinder Model 1:-200; 3 oz. Fellows Fully Automatic; 4 oz. DeMattia Semi-Automatic: 4 oz Crown Moldmaster Complete Fully Auto-Crown Moldmaster Complete Fully Automatic; 4 oz. Reed Prentice Wheelco Controls 15 HP MD; 6 oz. Watson-Stillman with 2 Wheelco Controls; 8 oz. Reed Prentice Double toggle; 8 oz. Impco Mdl. VF-3. Compress. & Transf. Features, Extra 12 oz. Cyl.; 9 oz. HPM 200 Ton Fully Automatic; 16 oz. Reed-Prentice No. 10-E-16, Elec. Htd, 1948; 22 oz. Impco, Model VF 8-22; 24 oz. DeMattia Model B, Inspect in Operation.
Mills, Rubber, Plastic: 16"x68" Farrel, Rubber/Plastic; 18"x50" Farrel, Rubber/Plastic; 10. 2 Abbe Eng. Co., Eureka Porcelain Jar Mill, Roller Chain, related to the control of the contr

reka Porcelain Jar Mill, Roller Chain, Motor Drive (2).

Motor Drive (2).

Presses, Hydraulic: 1 Ton Denison 1½

HP MD; 2 Ton Denison 3 HP MD; 5 Ton,
Logan, Twin Ram 7½ HP, MD; 15 Ton
Baker Fully Automatic; 15 Ton, Stokes
No. 200 D-2 Automatic (10); 15 Ton Consolidated Self Contained; 15 Ton Stokes 200 D-3; 20 Ton Elmes No. 3429P Lab-oratory, Electrically Heated Platens 8"x 8"; 25 Ton Consolidated 24"x30" Self Contained Pump & Motor; 30 Ton Wat-MD; 30 Ton Baker, Full Automatic Model 958, Excellent Condition, New 1951; 30 Ton HPM Upmoving 12"x12" Platen 12" DLO 12" Str with Controls; 35 Ton HPM Down-Acting, Ram 6"x6" Str., Bed 12"x 6", DLO 15", Self. Cont.; 40 Ton Francis 4 Opening, 12"x12" Elec. Heated Platens; 40 Ton Localis 4 opening, 12"x12" Elec. 40 Ton Loomis, 4 opening, 12"x12" Elec. Heated Platens, MD Self-Cont.; 10 Ton Heated Platens, MD Self-Cont.; 10 fon Baldwin-Southwark Angle Molding Press, Practically New; 50 Ton Bliss, 20°x20" Platen 20° Str. 60 HP MD; 50 Ton Stokes, Semi-Auto., Self. Cont.; 50 Ton Farrel 12"x12" Upmoving; 50 Ton Watson-Stillman 12"x17" Elec. Htd. Ton Farrel 12"x12" Upmoving: 50 Ton Watson-Stillman 12"x17" Elec. Htd. Platens, MD Pump; 60 Ton Elmes Hydr Straightening Press; 75 Ton Farquhar, Up-Acting, 30"x42" Platens; 100 Ton Farquhar, Dawing, Stroke 36", Hi-Speed Appr., Press, Return; 100 Ton Farquhar, Self.-Cont., Down Acting Ram 11"x26" Str. 20"x28"; 100 Ton Stokes Standard Semi-Automatic Power System Timing Controls; 100 Ton Watson-Stillman, Platens 13"x13", Ram 3½"x3" Str., MD Pump; 100 Ton HPM 72" Str. Piston 30"x30" DLO Fast Acting; 100 Ton Watson-Stillman, 4-Post, Platens 11-¾"x12", Ram x"x15" Stroke; 100 Ton Watson-Stillman, Bed 22"x20", DLO 24", Self. Cont.; 100 Ton Baldwin Down Acting, 12" Ram x 12" Str. 36"x36" Bed; 100 Ton Lake Erie Hi-Speed, 24"x24" Bed, 12" DLO, Self. Cont.; 13 Ton French Oil Mill 6 Opening Elec. Htd. Platens 15"x18"; 113 Ton ing Elec. Htd. Platens 15"x18"; 113 Ton R. D. Wood 5 Opening Elec. Htd. Platens rt. D. Wood 5 Opening Elec. Rid., Fatens 14"x20"; 113 Ton Stewart Bolling, 20"x20" Steam Platens 12" Upmoving Ramx14" STR; 150 Ton Stokes Standard Semi-Automatic Power System Timing Controls; 150 Ton Carey, Platens 20"x16" Adj., DLO 8"x28"; 175 Ton Viceroy Slab-Side 24"x4" Elec 14th Platens with Hord Side 24"x24" Elec. Htd. Platen with Hand Pump; 200 Ton Stokes Semi-Automatic Power System Timing Controls; 200 Ton Elmes 14" Ram x 42" Str. 24"x30" Bed; Elmes 14" Ram x 42" Str. 24"x30" Bed; 215 Ton Lake Erie Self. Cont. Semi-Auto. Bed 36"x36"; 225 Ton Farrel 4" Ram x 18" Stroke L-R 26½" x F-B 24½" 7½ HP MD; 275 Ton Watson-Stillman Up-acting 24"x54" Platens 2-14" Rams; 300 Ton Stokes Semi-Automatic Power Sys-tem Timing Controls; 625 Ton Farrel, Steam Platens 52"x52". Pump, Mtr., Con-trols, Under Power; 669 Ton Morane, 3

Upmoving Rams, 16" Stroke; 1200 Ton HPM, 15 Openings, 100"x120" Steam Plat-ens, Self-Cont. (2); 2000 Ton Birdsboro, Down Acting Self-Cont. Bed 53"x144" 2-29" Rams by 30" Stroke; 2400 Ton Birmingham, Balt Press, 65"x26'6", 24-11"
Rams; 4000 Ton Mesta 3 Upmoving 30"
Rams x 20" Str. Bed 34"x351".
Pulverizer: Model #W30-H-SP Buffalo.
Furnaces and Ovens: Messikans

Furnaces and Ovens: Megatherm. 3/60/220, 5 EN, 2-3 Lb. Phenolic Per. Min. (8); Despatch Mdl. Diaz-7583, 3 Drawers, 17"x17"x5" (2); Despatch Mdl. Pihd-8, 8 Drawers, 12x18x2½" (2); Thermonic Induction Heater Model M-285 12 EVA at Full Load; Gehnrich Gas-Fired 6' x6'x6' Walk-in Heato to 400°.

monic induction Heater Model M-283 12.

EVA at Full Load, Gehnrich Gas-Fired 6' x6'x6' Walk-in Heato to 400°.

Tablet Machines: Model 280-C Stokes 100 Ton Single Punch; Model C-4 Stokes Single Punch Dual Pressure 15 Ton MD; Model R Stokes, Single Punch, Variable Speed Motor Drive, 3 HP; No. RB-2 Stokes, 16 Station, Motor Drive, 2 HP; Model 45 Defiance, 200 Ton, 15 HP, Vari-Speed, MD; Model 61 KUX 30 Ton Single Punch; No. 2 RP Colton, 16 Punch, Rotary, Motor Drive 1½ HP; No. 3 RP Colton, 16 Punch, Rotary, Motor Drive 1½ HP; No. 3 DT Colton 25 Ton Single Punch; Model F, Stokes, 23 Stations, US Vari-Drive, 10 HP; No. P-3 Stokes 60 Ton Dual Pressure 15 HP Vari-Speed Drive; No. 294 Stokes Dual Pressure 60 Drive; No. 204 Stokes Dual Pressure 60 Drive; No. 205 Stokes Single Punch 2 Ton V-S Md; Model E Stokes Single Punch 2 Ton V-S Md; Model T Stokes Hydraulic Equalizer MD.

Pumps: 200 CPM, 2500 Psi Worthington Horizontal, Duplex, DA 3-34"x18"; 71½ Gal. Dennisn Model PUV 3.75 1000 lbs. 3 HP Motor T Tank.

Mixers: No. 3A Banbury, 150 HP MD Rubber/Plastic; No. 3 Banbury, 150 HP MD Rubber/Plastic; No. 3 Banbury, 160 Qcl. Reed Vertical 3 Speed HP MD; 100 Gal. Readco Jacketed, Sigma Blades; 500s New Era Single Blade Dough Mixer; 1000s J. H. Day Size D-16 Jacketed Ribbon Blender.

Calendars: 24"x88" Farrel-Birmingham 3 Roll, 50 HP DC Motor; 14" Web John

Calendars: 24"x48" Farrel-Birmingham 3 Roll, 50 HP DC Motor; 14" Web John Waldron 2 Roll Embossing Calendar 3 HP Vari-Speed, Never Used.

Yari-speed, never Used.

Take-Up Equipment: 36" Royle, Capstan, Take-Up.

Granulator: No. 43-A Stokes Oscillating Granulator, Spare Roll.

Trimmer: 50 Ton Model Metal Stamping Trimmer Model 1C-½-6 Fully Auto-

Impregnators: No. 56 Av. Stokes Vac-uum with Storage Tank 2914" Dial x 42" Vac. Pump.
Paint/Ink Mills: 5"x12" 3 Roll J. H.

Day Lab Mill. Pelletizers:

Day Lab Mill.
Pelletizers: Mitts & Merrill Model
10-N-6 16 HP V.S. Drive.
Reactors: 5 Gal. Patterson-Kelly.
Stainless Steel, Elec. Htd. with Agitator.
Johnson Machinery Co., 679-P Frelinghuysen Ave., Newark 5, N.J. What do
You Need? What Do You Have To Sell?

FOR SALE: 1—Cumberland #0 Rotary Cutter; 4—Two Roll Mills 15"x40", 6"x 12"; 2—Baker Perkins 316 SS, 100 gal. and 50 gal. jacketed double arm Mixers; 1—Stokes Model DD2 Rotary Preform Press; 1—Stokes #294 Single Punch Pre-form Press; 4—Stokes Model R Single Punch Preform Presses; 1—Kux Model Funda Presons Presses; 1—Aux Model 15-25 Rotary Preform Press; Also: Sift-ers, Banbury Mixers, Powder Mixers, etc., partial listing; write for details; we purchase your surplus equipment; Brill Equipment Co., 2407 Third Ave., New York S1, N. Y.

(Continued on page 266)

1

GUARD THE HEALTH OF YOUR EMPLOYEES

Pure Silicone Fluid Spray MOLD RELEASE

Zinc Stearate Dry Spray MOLD DUSTER *

NON-TOXIC MOLD RELEASES

GUARANTEED SAFE UNDER ALL

CONDITIONS



You can tell which way it will spray!

AVOID CUT-RATE SUBSTITUTES!

Some low-cost sprays may contain poisonous solvents.

Better Be Safe Than Sorry!

PRICES — Silicone Spray—
(Delivered)

(Delivered)
Sample Can\$2.00
Per Dozen\$18.00
Per Gross\$197.40

PRICES - Dry Duster-

(FOB Cleveland, O.)

Sample Can \$2.00
Per Dozen \$13.80
Per Gross \$144.00

Further discounts on larger orders shipped on your schedule. Full minimum freight allowed on IMS Silicone Spray. Same day shipment!

BE SAFE!
USE IMP RELEASES



SILICONE SPE

long lasting

MOLDRELEASE

IS THE PERFECT MOLD LUBRICANT

Genuine IMI Quality Pro

non-marking

Avoid crazing and costly stress cracking of polyethylene film or molded parts

USE IMS ZINC STEARATE

The Only SAFE Release for Polyethylene. Non-Oily!

Use Also on Parts
To Be Painted or Plated!





INJECTION MOLDERS SUPPLY CO.

3514 LEE ROAD . WYoming 1-1424 . CLEVELAND 20, OHIO

1

V

(Continued from page 264)

FOR SALE: Vacuum Metallizer 36". FOR SALE: Vacuum Metallizer 36".— Continuous Process Extruding, Vaeforming, Blanking op. on 4½" Extruder.—Injection Presses: 3.24 oz. Reed, 4,9,16 oz. HPM, 6,8,12 oz. Lester, 16,24 oz. Watson, 8 oz. vertical Giddings, 4 oz. Lewis, 1 oz. Van Dorn. For Extruder: 30" Sheet. Die, 52" Pull-Off, 48" Sheet Stacker, Conveyors.—Despatch 48"x72" Sheet Preheat. Oven. Apex 2 color Container imprint Oven. Apex 2 color Container Imprint. mach. — Scrapgrinders. — Compression & Transfer Presses 50 to 600 ton. 30 T. Elmes Hydrolair press. 2 KW & 5 KW Electr. Preheaters. Stokes No. 280 Preformpress.—Auto-Vac 52x30° Forming Mach. 1,000 lbs. Paterson Conical Mixer.—All Midwest locations. List your surplus equipm. with me. Justin Zenner, 823 Waveland Ave., Chicago 13, Ill.

Lester type L-2-8 Injection Molding Machine, 8 oz. capacity, complete with instruments. Excellent running condition, immediate delivery. Can be seen in operation. Sterling Plastics Co. 1140 Commerce Avenue Union, New Jersey

FOR SALE: 1 oz. & 2 oz. Van Dorns Model H-200; 1 oz. & 2 oz. Moslos; 3 oz. Fellows, never used; 4 oz. Lesters, fully automatic, new 1953, trades accepted; oz. Lewis, 1955, \$6,250; 4 oz. Lester vert. 1946, \$3,000; 4/6 oz. Reed-Prentice, most new; 6 oz. Watson-Stillman, v most new; e oz. watson-Stillman, vert.; 6 oz. Fellows, new 1955; 8 oz. DeMattia toggle, \$4500; 8 oz. Reed-Prentice w/10 oz. cyl., 1946, \$6000; 8 oz. Lesters, \$5500; 9 oz. H.P.M.. \$6500; 12 oz. DeMattia toggle, \$6000; 12 oz. Reed-Prentice Model E, \$8500; 12 oz. DeMattia Model C, \$10,-500; 12 oz. Watson-Stillman, 1948, \$9500; 12 oz. Lester, 1954; 16 oz. H.P.M., \$9000; oz. Watson-Stillman, \$10,000; 20 oz ster; 20 oz. H.P.M.; 32 oz. Lester; 40 Lester: H.P.M. Model 400P, 1955, \$35,000; iders; platform lift; Hopper dryers; cylinders; #30 Kux Die cast machine: ovens. Let us list your surplus equip-ment. Acme Machinery & Mfg. Co. 120. 2315 Bway, New York, N.Y. Su 7-1705.

FOR SALE: 800 ton laminating pres with 23 openings 26"x38". 300 ton lami-nating press with 10 openings 40"x40". nating press with 10 openings 40"x40". 300 ton upstroke press 22"x35" platens. Brunswick 225 ton 21"x21" platens. Farrel 200 ton 30"x30" platens. 200 ton Hobbing Press 18"x14" platens. D & B 150 tons, 24"x24" platens. Adamson 80 ton, 20"x20" platens. Farrel 200-ton 20"x80" platens. French Oil 120 ton self-contained 18"x22" platens. W. S. 40 ton self-contained with 12"x12" elect. heated platens. Also Lab. to 2.000 tons from 12"x12" to 48"x48". Hydr. Pumps and Accumulators. Stokes Automatic Molding Presses. Van Dorn 1 oz. Injection Molding Machine. Stokes R single punch, Preform Machine 23/5", single punch, Preform Machine, Kux 23/5" dia., single punch Preform Ma-chine. Mills and Calenders up to 84". New Seco 6"x13" and 8"x16" Lab. Mixing Mills and Calenders. Hartig 33/4" Plastic Extruder. Plastic and Rubber Extruders. Oxford 57" Slitter. Rotary and single punch Preform Machines, 3/5" to 4". In-tesion. Walding Machines 1 oz. to 60 oz. Machine, jection Molding Machines 1 oz. to 60 oz. Baker-Perkins & J. H. Day Jacketed Mixers. Plastic Grinders. Gas Boilers. Partial listing. We buy your surplus ma-chinery. Stein Equipment Co., 107-8th Street, Brooklyn 15, New York. Sterling

FOR SALE: 1 French Oil Mill 200 ton self-contained molding press, 48x72" platen; 1 Stokes standard 150 ton semi-automatic molding press; 2 Stokes T.R preform presses; 1 Modern Flastics 1½" electric extruder; 6 Cumberland 2½ plastic granulators, 3 HP; also mills, calenders, sitters, etc. Chemical & Process Machinery Corp., 52 Ninth Street, Brooklyn 15, N.Y.; Tel: HYacinth 9-7200.

MACHINERY FOR SALE: 1-8 oz. Reed Prentice, model 10D-8, (1946) 2-12/16 oz. DeMattia, Model C-1, (1951) fully hydraulic clamp, 36" daylight. These machines are in well maintained condition and can be seen in operation anytime. Reply Box 1810, Modern Plastics

NEW ARRIVALS FOR SALE: French Oil NEW ARRIVALS FOR SALE: French Oil Mill Mehy. Compression Molding Presses; 75-170 tons, 3-170 tons, 35"x18", 5-95 tons 29"x18", 3-75 tons 18"x17", 5 Preheaters 2 KW, Wood 20"x20" 12" ram 170 tons; Southwark 24"x24" 12" ram 170 tons; Southwark 24"x24" 12" ram 170 tons; Baldwin Southwark 4-26"x26" 8" rams, 75 tons; 5-26"x26" 7" rams 57.7 tons; 2-15"x15" 8" rams 75 tons; 2-19"x24" 10" rams, 78 tons; 2-12"x12" 7" rams, 57.7 tons; 2-0&B 12"x12" 7" rams, 57.7 tons; 3"x9" 4"y" rams, 24 tons; D&B 12"x12" 3" 8"x9" 41/2" rams, 24 tons; D&B 12"x12" 3" rams, 10 tons; HPM Transfer Molding 75 tons; Preform Presses, Colton 5\\(^{1}_{2}T Stokes R and DDS-2MD; New Univer-Stokes R and DDS-2MD; New Universal Dual Pumping Units 3-15 HP; Lab. Mills and Calenders; also Extruders, Mixers, Vulcanizers, Injection Molding Units, etc. Universal Hydraulic Machinery Co., Inc., 285 Hudson St., New York 13.

FOR SALE.

One Sixty-six inch hi-vacuum ma-chine, National Research make. Fully equipped with air operated valves, two sixteen inch diffusion pumps, Booster pump, 300 foot Kinney pump. In excellent working order and condition. Fast cycles. Reply Box 1825, Modern Plastics

ALMOST NEW—MAKE BEST OFFER: 1-25 gallon Annealing Tank manufactured by Sta-Warm Electric Company, Ravenna, Ohio. Type V-953-WS, Serial No. 4706-A. 8.8 Amps, 440 Volts AC. 3 Phase 60 Cycle. 1 Acromark specially constructed Counter Wheel Marking Machine Model 9AA4. Serial No. 97176. Manufactured by The Acromark Company, 9-13 Morrell St., Elizabeth 4, N.J. Approximately 200 pounds of hitec heat Approximately 200 pounds of hitec heat transfer salt (sodium nitrate—sodium nitrite) manufactured by E. I. du Pont de Nemours, Inc., Wilmington, Delaware. This salt is in a wooden barrel. Ray-bestos-Manhattan, Inc., Manhattan Rub-ber Division, Passaic, New Jersey.

FOR SALE: Compression Molding Presses FOR SALE: Compression Molding Presses very good condition; one 75 to 100 ton Watson Stillman 13" dia. downwards moving ram 22x20" platens 22" daylight self-contained with Vickers pump and 5 HP motor priced \$2300; one 400 to 500 ton 20" dia. upwards moving ram 31x30" platens 40" daylight with pullbacks and transfer cylinder with 4 columns 7" dia. transfer cylinder with 4 columns 7 dia.
priced \$3800 pithout pumping unit; one
DeMattia #4 Scrap Grinder with 2 HP
motor \$425; three heavy duty mixers 1,
10, and 60 gallons; one 1" NRM Laboratory Extruder like new. Location near
Chicago. Reply Box 1822, Modern Plas-

JUST OUT OF OPERATION

JUST OUT OF OPERATION.

11—Lourie Hyd. Presses—6" Ram—30
Ton Cap.; 2—Elmes Hyd. Presses—5"
Ram—50 Ton Cap.; 2—French Oil
Mill Hyd. Presse—50 Ton 9" Ram;
1.—Elmes Hyd. Press—13" Ram—60
Ton Cap.; Complete with Hyd. High
& Low Pressure System of: 4—
Vickers Hyd. Pumps: Air Receiver
Tank: Watson-Stillman Hyd. Accumulator 2000 lb.; 2 Stage Worthington
Compressor: Low Pressure Bottle
Tank. For Complete Specifications
and quotation contact:
M. Cooper

M. Cooper 1759 West Grand Ave.

FOR SALE: Stainless Steel Rotary Dryer. Link Beit Co., 5'2"x16". No. 502-16, with all aux. equip. Roto louvre also 6'x24' and 5'x26'. Hersey Stainless Steel Rotary Driers. Reply Box 1811, Modern Plastics.

FOR SALE: 1-Model T Stokes Preforming Press like new one half new price \$1750.00—Synthane Corporation, Oaks,

FOR SALE: Available at bargain prices: FOR SALE: Available at bargain prices: Baker Perkins 50 gallon Steel and Stain-less Steel Steam Jacketed Heavy Duty Mixers with Stainless Jacketed Blades. motorized power tilting, motor driven. W & P 200 gallon Heavy Duty Mixer, tilting type, with Sigma Blades. J. H. Day from 1 qt. to 150 gal., Imperial and Cincinnatus D.A. Jacketed, Sigma Blade Mixers. Day 15 to 10,000 ibs. Dry Powder Mixers. Mikro Bantam, 15H, 1F, 2TH. 3TH Pulverizers. Gemco 1000 lbs. 30 cu. ft. Vacuum Double Cone Blender. Day, Rotex. Tyler-Humer. Robinson. Rayft. Vacuum Double Cone Biender. Day, Rotex, Tyler-Hum-mer, Robinson, Ray-mond, Gayco, Great Western Sifters. Stokes DD2 and RBB Tablet Machines. Colton 2RP and 3RP Rotary Tablet Ma-chines. Package Machy. FA, FA2, FA4, Miller, Hayssen, Scandia, Hudson Sharp. Oliver Auto. Wrappers—all sizes. This is only a partial list. Over 5000 machines in only a partial list. Over 5000 machines in stock available for immediate delivery. Tell us your machinery requirements. Union Standard Equipment Co., 318-322 Lafayette St., New York 12, N.Y.

FOR SALE: 2000 ton W-S Press, 12" ram stroke, steam platens 60"x46", with FOR SALE: 2000 Stroke, with Vickers Pumps—one French Oil Mill 200 ton self-contained Press, 48"x72" platens Weshings fi to 20 oz.—50 ton -Injection Machines 6 to 20 oz.-50 tor 12"x12" Molding Presses-34" double sole noid and cam operating valves,—Carver laboratory presses—6"x12" laboratory laboratory mills. Plastic Machinery Exchange, 426
Essex Ave., Boonton, N. J., Telephone

FOR IMMEDIATE SALE.

Reed-Prentice Injection Machines— 10D-6, three 10D-8's (late models), 10D-10 and 10H-24 oz. Also 16 oz. Watson-Stillman. Machines in good operating condition, available for in-spection. Reply Box 1821, Modern

FOR SALE: 1—Royle #4 Extruder, motor driven; 1—6"x12" Laboratory Mill, m.d.; 1—Ball & Jewell Rotary Cutter, size O m.d.; 2—Baker-Perkins Size 15, 100 gal. Jacketed Mixers: 5—Horizontal Dry Powder ribbon Mixers, 4000#, 1500#, 500#; 1—New 3 Roll 6"x16" Laboratory Calender; 1—Farrel-Birmingham 60" Mill with reduction drive, 150 HP motor, floor level mounting: 1—Fitzpatrick "D" FOR SALE: 1-Royle #4 Extruder, motor floor level mounting; 1—Fitzpatrick "D" Comminutor, S.S. contact parts, jacketed; -Mikro Pulverizer #2th, with motor; -Reed-Prentice & W-S Injection Mold-4—Reed-Prentice & W-S Injection Molding Machines , 2-16 oz.; Also other sizes: Hydraulic Presses, Tubers, Banbury Mixers, Mills, Vulcanizers, Calenders, Pellet Presses, Cutters. Send us your inquiries. What have you for sale? Consolidated Products Co., Inc., 50 Bloomfeld Street, Hoboken, N. J. HOboken 3-4425, N.Y. Tel.: BArclay 7-0600.

FOR SALE: (11) 75 ton record presses, complete @ \$2,450, (11) new 100 ton, 10" ram. 10" stroke @ \$1,100, (8) 200 ton, 9" stroke, 14" ram, 36×36 @ \$1,850, (7) 200 ton, 9" stroke, 15" ram, 30×30 @ \$1,650. (1) 50 ton complete. 18×18 @ \$1,850, (1) 200 ton, 16" ram, 30×30 @ \$2,450, (2) 200 ton, 16" ram, 30×30 @ \$2,450, (2) 200 ton, 16" ram, 42×42 @ \$2,850, (4) 250 ton, (2) 12" rams, 30×50 rebuilt @ \$3,75. Hydraulic Sal-Press Co., Inc., 388 Warren Street, B'klyn, N. Yo., FOR SALE: (11) 75 ton record press Street, B'klyn, N. Y.

FOR SALE: Injection Molding Machine. 1954 Lewis No. 6 with oversize cylinder. 8 ounce capacity. Like new, \$10,500. Pyramid Products Co. Inc., 3967 E. 93. Cleveland 5, O.

FOR SALE: Two 3¼" Hartig Plastic Extrusion Machines electrically heated complete with Wheelco control and 30 H.P. 220 volt a.c. 60 cycle motors. Reply Box 1803, Modern Plastics.

Machinery and equipment wanted

WANTED: Injection presses 1, 2, 3, 5 oz., Reeds or HPM, age 1952 or later. Submit complete details. Plasti Productions, 103 rue Bara, Brussels, Belgium.

(Continued on page 269)



Big production—basic integrated production—low-cost production of a range of diisocyanates now makes possible rapid expansion of commercial urethane uses.

That, in a nutshell, is the significance of our new Moundsville, West Virginia NACCONATES plant.

It is a major multi-million dollar facility, fully integrated through Allied Chemical resources right back to essential raw materials. It is backed by complete technical data, application data and field technical service for urethane users.

The entire National NACCONATES story is yours for the asking—via the handy coupon below. First come, first served—in the order of urgency. So please check the coupon completely and attach it to your Company letterhead.

NATIONAL ANILINE DIVISION

ALLIED CHEMICAL & DYE CORPORATION 40 RECTOR STREET, NEW YORK 6, N. Y.

Akren Atlanta Boston Charlotte Chattanooga Chicago Columbus, Ga. Greensboro Los Angeles New Orleans Philadelphia Porfland, Ore. Providence Richmond San Francisco Toronto



*Trademark

large-scale
output assures
ample raw materials
for mass-produced
urethanes

- ☐ I am now working with diisocyanates; ☐ working in areas where they may be used; ☐ broadly interested in data only.
- ☐ Withou: obligation, send me NACCONATES Product Data Package—6 technical bulletins on diisocyanates.
- Have representative call by appoinment.

NAME

POSITION

COMPANY

ADDRE

G-7

W

4

Stanpreg pre-impregnated materials

POLYESTER glass cloths, woven rovings and mats combine maximum strengths with flame resistance for commercial and military applications.

EPOXY glass cloths and papers for optimum electrical and physical characteristics. Flame resistant and high temperature resistant types available.

> PHENOLIC glass cloths and mats, papers and cotton cloths for high structural and high temperature resistant qualities.

SILICONE glass cloths for maximum strengths at exceptionally high temperatures.

XXXP - Cold Punch Phenolic paper for excellent electrical characteristics combined with outstanding cold punching properties in laminates up to 1/8" thick.

For your Reinforced Plastic requirements.

Uniformly resin impregnated and catalized Stanpreg materials are instrumental in achieving maximum production rates while cutting rejects to a minimum. Optimum properties of Stanpreg products are designed to meet a wide range of government and industrial specifications.

Write or call for complete information.



tandard Insulation c_{\circ} .

> 80 Paterson Avenue East Rutherford, New Jersey Telephone: WEbster 9-5400



SUPERIOR DESIGN and construction features of this compact, easy-to-operate Panel Saw reduce labor costs . . . increase production on all volume sawing operations.

- . LOW INITIAL COST
- . ECONOMICAL OPERATION
- . ADJUSTABLE SAW HEIGHT for
- . CONTROLLED ARBOR SPEEDS
- . SEPARATE VARIABLE-SPEED FEED
- . QUICK, EASY ADJUSTMENTS
- SHIPPED COMPLETE ready to instell and use

COST-CUTTING SAWS FOR THE TRADE

GAYNES ENGINEERING CO.

TATE W FULTON ST . CHICAGO 12, ILLINOIS



If you need a hydraulic bench press for any purpose in the field of rubber moulding, plastic, laboratory testing or graphic arts, write for circular or if you prefer we'll have our nearest representative call on you...

PHI PRESS formerly Preco

Pasadena Hydraulics, Inc.,1433 Lidcombe Ave., El Monte, Calif.

(Continued from page 266)

WANTED: Baker-Perkins Mixer. 100-200-gallon working capacity. Must be tilting type with Sigma blades. Double arm. Prefer a jacketed mixer. In reply state condition and price. Reply Box 1812, Modern Plastics.

WANTED: One Double Arm or Ribbon Jacketed Mixer. Capacity 100 Gals. or More. Reply Box 1805, Modern Plastics.

Materials for sale

MATERIALS FOR SALE

MATERIALS FOR SALE.
25,000 lbs. Reground Butyrate in Assorted Colors; 18,000 lbs. Clear Reground HM-140 Acrylic; 22,000 lbs. Mixed Colored Cellulose Acetate. Claude P. Bamberger, Inc.
1 Mount Vernon St.

Ridgefield Park, N. J.
Tel: HUbbard 9-5330. Not connected with any other firm of similar name.

FOR SALE: We have for immediate de-livery the following: 50,000 lbs., reproc-essed polyethylene, black; 15,000 lbs., vir-gin, off-grade polyethylene pellets, white. Kent Plastics, Inc.. 830 Monroe Street, Hoboken, N. J., Tel: HOboken 2-2020-1.

SURPLUS RIGID VINYL FOR SALE. SURPLUS RIGID VINYL FOR SALE. Exporter has surplus rigid vinyl sheets 20x50 mostly all gauges and basic colors. Let us quote on your needs, large or small. Reply Box 1830, Modern Plastics.

Materials wanted

THINKING OF SELLING SCRAP? Call Gem City, your best market for nylon, styrene, acetate, butyrate, acrylic and polyethylene in all forms. For quick, courteous, sincerely honest service you owe it to yourself to try Gem City Trading, P.O. Box 941, Dayton 1, Ohio. HE 2121.

WANTED.

WANTED.
Woloch will buy your thermoplastic scrap, obsolete molding powders, rejected moulded pieces.
George Woloch Co., Inc.
601 West 26th Street
New York 1. New York ORegon 5-2350

WANTED: Piexiglas and Lucite scrap, salvage and cut-offs, any quantity. Turn your surplus sheet stock into cash. Ask for our quotation. Duke Plastics Corp., 584 Broadway, B'klyn 6, N. Y. EVergreen 9-5590.

WANTED: Plexiglass cut-offs and salvage. Highest prices paid. Aristocrat Plastics, Inc. 23 Sussex Avenue, Newark, N. J.—MArket 3-5188.

WANTED.

Œ

Plastics Scrap and Rejects of all kinds. Ground and unground. Also rejected molded pieces and surplus virgin molding powders. Top prices

paid.
A. Bamberger Corporation
703 Bedford Ave., Brooklyn 6, N. Y.
MAin 5-7450

WANTED TO BUY: Polyethylene scrap in any form—scrap film, banana bags, prints, etc. Top price. Reply Box 1809, Modern Plastics

WANTED: Argentine importer buying small or large consignments of used, waste or remnants of polystrene, polyethylene, acetate, vinyl or nylon manufacture. Uniquely clear trade and good working conditions. working conditions. Offers and samples to R. Grabenheimer, Monroe 2385, Buenos Aires, Argentina.

WANTED.

Polyethylene scrap, medium molecu-lar weight, any color or mixed colors, melt index 1.5 to 2.5 preferred. We are a converter and pay higher prices than any dealer. Will contract for regular supply. Reply Box 1814, Modern Plastics

Molds for sale

FOR SALE: Complete line of Houseware Molds, Comb Molds, also some novelty and specialty items. No reasonable offer refused. Send for list. Reply Box 1820, Modern Plastics.

FOR SALE: Complete infant toy line. All molds and assembly fixtures to make four large pull toys and one novelty item currently on market and doing \$225,000 per annum. Going out of toy business. Reply Box 1800, Modern Plastics.

FOR SALE: German moulder offers complete line of toys and novelties. 50 moulds for 70 different up to date items like music toys, three-dimensional view-box, racing boat, tiddlewing games, egg laying hen, etc. against cash. Minimum \$15,000,--. No stock moulds but a run-ning program; price includes list of over-seas clientele. Reply Box 1808, Modern Plastics

Plants for sale

FOR SALE: Complete operating plant FOR SALE: Complete operating plant manufacturing Translucent reinforced fibrous glass shatterproof panels for windows, skylights, partitions and awnings. Production capacity is 1,890 square feet, (or 45 sheets at 144"x42") per 8 hour shift with six employees. Equipment includes a patent pending fibrous glass mat impregnating machine which eliminates costly hand layup that is prevalent amongst competitors. Equipment includes two automatically controlled circulating gas overs, mixers, chemical balances. gas ovens, mixers, chemical balances. Trimming facilities and molds to make a complete excellent quality product in all standard flat and corrugated panels. Floor space required is 2,000 square feet. Price \$20,000 includes formulations. Will consider leasing plant or selling stock to an interested active sales organization. Write to: Dipcraft Mfg. Co., 4830 Hat-field St., Pittsburgh 1, Pa.

OPPORTUNITY: Owner of a five-employee fabricating plant in southern Wisconsin, unable to find a manager, is forced by circumstances to offer all or part of his holdings. Production is mainly in acrylic sheet. Well equipped. No real estate. Select customers. Sales and administrative experience more important. ministrative experience more important than shop experience. About \$25,000 for physical assets. Write giving details about yourself. Reply Box 1819, Modern Plastics.

FOR SALE: A running, modern Plastic Extrusion plant is available for sale in Philadelphia. The prime equipment is two Davis Standard 2-½" Cross-head Extruders; auxiliary equipment includes automatic Cutters, Grinders, Winders, Air Compressor, etc. Reply Box 1838. Modern Plastics, for further information.

FOR SALE: Button factory. 3—150-Ton Stokes Presses, Dies, 4 Preform machines. etc. Reply Box 1815, Modern Plastics.

Help wanted

WANTED: Progressive North manufacturer of coated and laminated plastics has opening for dynamic sales personality with proven past record. Must be thoroughly experienced in develop-ment and marketing of new products in the plastic field. Top salary with rare opportunity to advance to executive sales position. Submit complete resume. Reply Box 1828, Modern Plastics.

VINYL COATINGS: We have a career op portunity for a man with at least five years' experience in formulating and deyears' experience in formulating and developing vinyl coated products, using the plastisol or organisol techniques. His major activity should have consisted of development of products on paper or fabric backings. Plant production experience is highly desirable. We are the oldest manufacturer of floor and wall coverings in the country, with excellent employee benefits; a nationally known. multi-plant, progressive organization. Write with full resume including salary desired to Warren F. Bietsch, Personnel Administrator, Congoleum-Nairn Inc., 195 Belgrove Drive, Kearny, New Jersey.

FOREMAN.

Experienced in shapes and rigid ma-terials for custom extrusion plant. Good salary and extra benefits. Unusual opportunity to advance with progressive firm in Los Angeles area. Ryko Products Inc. 877 So. East St. Anaheim, California

SUPERVISOR: Mass production opera-tion requires capable supervisor having thorough knowledge of one or more of the following lamination processes in-volving plastic, paper, or glass materials. Salary based on background and ability. All replies will be handled in strict con-fidence. Reply Box 1823, Modern Plastics.

FACTORY MANAGER: For Vinyl Plastic FACTORY MANAGER: For Vinyi Plastic Molding & extrusion plant located in Ohio. Must have experience and technical know-how along with Managerial Ability. State age, resume of past experience and salary desired. All information kept confidential. Reply Box 1835, Modern Plastice.

PRODUCTION FOREMAN: Man to take complete charge of small compression molding department. Must be able to make mold changes and assume full re-sponsibility for personnel. Salary ap-proximately \$6,000. a year. Boston area location. Reply Box 1839, Modern Plas-

PLASTICS ENGINEER.

PLASTICS ENGINEER.

Mechanical or Chemical engineer
0-5 years experience to work in development and extrusion of plastic
products with expanding plastics
group of new nylon-6 plant. Complete benefit plans, new opportunity
and excellent working conditions.

National Aniline Division. National Aniline Division
Allied Chemical & Dye Corporation
P.O. Box 831, Hopewell, Virginia.

SALESMEN: We are interested in employing two salesmen, age 27-45, for our Paper Coatings Division, selling decora-tive and functional coatings in Eastern and Midwestern territories. Chemical, paper, or allied sales experience required. Salary and expenses. Write Manager. Paper Coatings Division, Jones-Dabney Company, Newark 5, New Jersey, giving details of experience and salary require

WANTED—PRODUCTION ENGINEER: Must have engineering education and experience in plastics, capable of general supervision of industrial engineering, estimates, secondary tooling and plant problems. Will be responsible for the designing and building of all secondary equipment. The layout of the above mentioned equipment will be required of the individual we would employ. Plant does custom and proprietary compression and injection molding. Company over 25 years in plastics, and still expanding. Give complete resume of education, experience and past earnings. Reply Box WANTED-PRODUCTION ENGINEER: perience and past earnings. Reply Box 1813, Modern Plastics.

(Continued on page 270)

(Continued from page 269)

PROJECT LEADER.

M.S. or Ph.D. in Chemistry or Chem. Engineering. To plan and carry out Research and Development work re-lating to the combination of plastics and paper by coating, impregnation, extrusion, and lamination. Also, to de-vise new and improve methods of vise new and improve methods of imparting barrier properties onto paper. Three to five years experience in paper coatings are required. A thorough knowledge of polymer chemistry and paper-coating equipment is essential. This new and expanding research facility presents an excellent opportunity to grow with the organization. Send details of education, experience, and personal data

Director of Research West Virginia Pulp and Paper Co. Mechanicville, N.Y.

CHEMIST or CHEMICAL ENGINEER: With experience in paints, resins, or plas-tics for process development work in Fiber Glass Industry. Excellent opportunity within an expanding operation. Pleasant and progressive community with reasant and progressive community with excellent schools. For confidential consideration, please send resume of training and experience with salary desired to: Director, Plant Industrial Relations, Pittsburgh Plate Glass Company, Works #50, Shelbyville, Indiana.

HELP WANTED.

HELP WANTED.

Designer of Vacuum Forms—large progressive firm in New York area with most modern production machinery is looking for top notch designer of vacuum formed articles. A wonderful opportunity for experienced man with complete "knowhow" and ability.

Reply Box 1806, Modern Plastics.

POLYETHYLENE BLOWN TUBING & Flat Film Plant Manager: Chemical En-gineer thoroughly familiar with tech-nique and plant management. Important managerial position with large Eastern Established Producer. Salary open. Experience absolutely essential. Write fully. Reply Box 1801, Modern Plastics.

PRODUCT MANAGER.

A national chemical corporation seeks a man experienced in Polyethylene Films or Resins: Responsibilities will be for: Product/Market development and Sales Planning. Age 30-40. College Degree. Our employees know of this advertisement. Submit detailed resume and salary requirements to Box 1836, Modern Plastics.

WANTED: Salesman to sell output of manufacturing company making molded and extruded products of plastics for industrial trade. If interested, please state engineering background, sales ex-perience and age. We are more interested in sales ability than engineering ability. Salary and bonus for successful man. Reply Box 1802, Modern Plastics.

Situations wanted

AVAILABLE IMMEDIATELY: Modelmaker, designer, eleven years experience with top cosmetic firm. Experienced in with top cosmetic firm. Experienced in model shop management, and coordination between design and production of plastic, wood and metal models, displays, paper boxes and design of sales presentation kits. Currently employed but seeking change. Interested in Metropolitan N.Y. or N.J. area. Reply Box 1829, Modern Plastics. ern Plastics

SELF EMPLOYED CONSULTING ENGI-NEER desires to associate with progressive company where ability and ambition will be recognized. Prefer Southern or Western States. Experienced in Busi-ness Administration. Sales Production. Quality Control, Engineering, Product Design, Development and Promotion, in the Injection Moulding. Vacuum Forming, and Reinforced Plastics phases of the industry. Resume sent upon request. Reply Box 1840, Modern Plastics.

CHEMIST - PLASTICS ENGINEER: Proven, versatile background in product development having formulated vinyl development having formulated vinyl plastisols, plastigels, foams, acrylics, epoxies, polyamides, latices; production management, supervising extrusion, vac-forming, chemical processing, control, assembly, personnel; technical service, trouble shooting; conscientious, person-able, and adaptable; member ACS, SPE; 34; seek challenging position with a growing organization that affords growth opportunities. Reply Box 1831, Modern Plastics.

VINYL CONSULTANT.

Specialist in formulations, sponge lined and clear boots, doll parts, toys, balls, automotive parts, coatings, casting specialty items, washers, packing glands etc. Latest processes in rota-tional, slush and vacuum forming. Automatic and semi-automatic machine designs available. Complete training from model to plant production. No manufacturers represented, sell only services.
Reply Box 1834, Modern Plastics.

CHEMICAL ENGINEER: Canadian. Married. 36. 612 years experience in textiles and thermoplastics. Sound background in testing, development, production con-trol of vinyl film and sheeting (flexible and rigid) flooring, laminates. Now em-ployed by leading Canadian vinyl producer. Reply Box 1841, Modern Plastics.

LITERATURE SPECIALIST: Chemist with extensive industrial experience in patent and literature searching, compiling bibliographies, editing, writing re-ports, translating, and abstracting in the fields of resins, rubbers, drying oils, and petroleum requires position in Northern New Jersey. Reply Box 1833, Modern Plastics.

PLASTICS PRODUCTION SUPERVISOR: Age 36. Chemical Engineer with 10 years of excellent experience in vinyl calender and plastisol coating. Product develop-ment, project planning, raw material evaluation, equipment design, schedul-ing, cost control, and direct production supervision. Seeking challenging position of responsibility with company directly concerned with plastics field. Midwestern or southern location preferred. Reply Box 1816, Modern Plastics.

Sales agents wanted

FIELD REPRESENTATIVES: Manufacturer producing high quality rigid and flexible vinyl laminates for use in furniture, wall covering, rainwear, tarpaulins luggage, shoes, etc. seeks service of representatives with good following in these trades. Tremendous potential. Top commissions. Several territories open. Reply Box 1827, Modern Plastics.

SALES AGENTS: Well rated extruder of SALES AGENTS: Well rated extruder of flexible vinyl custom extrusions has openings in New York, Baltimore, Atlanta, Florida, Wichita, Kansas City, Omaha, St. Louis, Minneapolis, Detroit, Cleveland, Cincinnati and Pittsburgh, Midwest plant location, operate own tool room and compounding, engineering and development resistance, were compatidevelopment assistance—very competi-tive. Quick service on inquiries, samples and shipments. High volume capacity commission basis. Reply Box 1832, Mod-

SALES REPRESENTATIVES: Add ex-SALES REPRESENTATIVES: Add extraded plastic parts and subassemblies to your present line of plastic products. New equipment, experienced management to help you sell service and quality at competitive prices. Protected territory Write for complete proposal, giving lines now handled and territory desired. Quick Plastics. Jackson. Michigan. Plastics, Jackson, Michigan.

MANUFACTURERS REPRESENTATIVES WANTED: By injection molding com-pany located in Midwest. Excellent prospects for men now calling on indus-trial accounts. An expert knowledge of plastics is not required. Reply Box 1804. Modern Plastics.

FLORIDA DISTRIBUTOR WANTED: Prominent. AAA-I producer of polyester resins, pigments, and foams requires Florida distribution to reinforced plas-tics trade. Reply Box 1842, Modern Plas-

Miscellaneous

DIES: We would like to buy dies for hobby horses. Reply Box 1826, Modern Plastics.

WANTED: Injection molds-one item or complete line of proprietary consumer articles, also interested in molds for inarticles, also interested in molds for industrial parts such as knobs, handles, fasteners, boxes, etc. Will consider purchasing complete injection plant with end products or parts line. Designers: New items wanted—cash or royalty. Victory Mig. Company, 1722 West Arcade Place, Chicago 12, III.—Estab. 1930.

PATENT: New Patent Polyethylene household article with great success in Europe. Patent licenses available for U.S.A., and Canada. Manufacturers Reply Box 1837, Modern Plastics.

3

1

REPRESENTATIVES: Are you looking for Canadian Representation? Canadian Company, well connected, desires additional plastic or affiliated products line, presently selling rigid Vinyl sheet and looking for exclusive agencies for Can-ada—cellulose acetate, etc. Reply Box 1807. Modern Plastics

DESIGN AND DRAUGHTING SERV-ICES: We specialize in particular, Molds for Plastics, Compression, Tra Trans-Molds for Plastics, Compression, Transfer and Injection, also jigs and fixtures. We offer a reliable, speedy and confidential service. We also have facilities to manufacture Molds, Jigs, Fixtures and special purpose machines and equipment Spotona Ltd., "Watchett Works," Oakhurst Road, Southend-on-Sea, Essex. England.

All classified advertisements payable in advance of publication. Closing date: 28th of second preceding month, e.g., January 28th for March issue

NEW RATES: EFFECTIVE MARCH ISSUE

For purposes of establishing rate, figure approximately 50-55 words per inch.

For further information address Classified Advertising Department, Modern Plastics, 575 Madison Azenue, N. Y. 22, N. Y.

MELAMINE IMPREGNATED PAPERS

in a wide variety of patterns, wood grains, solid colors, and translucent overlay grades for durable decorative laminates. Available in rolls slit to width, sheeted, or dis-cut to any shape required.

@ PHENOLIC IMPREGNATED PAPERS

for producing N.E.M.A. industrial grade laminates and molded parts for a wide range of electrical, mechanical, and structural applications. Precisely controlled processing assures uniformity of quality.

@ PHENOLIC IMPREGNATED FABRICS

such as cotton duck, cloth, and sheeting for high or low pressure molding. Available in grades to meet N.E.M.A. standards. Also used in producing gears, bearings, filters, helmets, and many other products.

PREGNATED MATERIALS

for Molding and Caminating

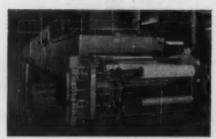
PHENOLIC IMPREGNATED GLASS CLOTH produced in special grades for fabrication of fly rods, aircraft and guided missile parts, plus many other products requiring a strong, light, durable material highly resistant to heat and corrosion.

POLYESTER IMPREGNATED MATERIALS

such as glass fabric and mat for low pressure molding of aircraft parts, tools, and other applications where high strength, light weight, ease of forming, and dimensional stability are essential properties.

SILICONE IMPREGNATED GLASS CLOTH in grades having excellent dielectric strength and resistance to distortion at high temperatures, plus other properties required for applications such as radar equipment, printed circuits, motors, etc.

● EPOXY IMPREGNATED MATERIALS custom treated to meet the highly specialized requirements of many electrical and electronic devices used for an ever-increasing number of military and industrial applications.



One of several giant impregnating ovens having roll capacities up to 90" in width. All are de signed for continuous quality controlled operation.

Whenever you need plastic impregnated and coated materials, you'll do well always to think of Fabrican first! For regardless of what your requirements may be, you'll find that Fabricon has what it takes to deliver the quality and service that you've been looking for. Years of experience with all types of thermosetting resins and fillers. Complete engineering and laboratory facilities for developing new products and processes. Special production equipment designed for precisely controlled, continvous, economical operation. Facilities, too, for slitting material to width, sheeting, or die-cutting to any shape required.

Want detailed information on the Fabrican Plastic Impregnated Material that's right for your particular product? Just outline the nature of your application and send it in today!



FABRICON PRODUCTS

A Division of The EAGLE-PICHER Company

1721 W. Pleasant Street . River Rouge 18, Michigan

Plastic Impregnated and Coated Materials . Reinforced Plastic Meldings



Modern Plastics, 575 Madison Avenue, New York 22, N. Y.

	Modern Plastics, 575 N	ladisor
255	Acheson Dispersed Pigments Co.	
218	Acromark Company, The	
151	Adamson United Company	
163	Aetna-Standard Engineering Co., The Akron Presform Mold Co., The	
28 204	Akron Presform Mold Co., The Allen Hollander Co., Inc.	
204	Allied Chemical & Dye Corp.	
267 61	National Aniline Div. Semet-Solvay Petrochemical	
123	Division Allis Chalmers, Industrial	
240	Equipment Division	
231	American Cyanamid Company Pigments Division	
143	Plastics & Resins Division	
233	American Molding Powder and Chemical Corporation	
60A	American Plastics Corp., A Subsidiary of Heyden Chem-	
100	ical Corp.	
183 241	American Pulverizer Company American Steel Foundries,	
241	Elmes Engineering Division	
208	Angier Adhesives, Division of Interchemical Corporation	
206	Apex Machine Company	91
273	Archer-Daniels-Midland Co.	21
249	Atlas Electric Devices Co.	2nd (
66	Atlas Powder Co., Chemicals Division	
125-127	Bakelite Co., A Div. of Union Carbide and Carbon Corp.	
149	Baker Brothers Inc	
6	Ball & Jewell, Inc.	
248 201	Bamberger, A., Corporation Barber-Colman Co., Wheelco	
	Instruments Division	
192	Battenfeld	
234 32	Becker & Van Hullen Bethlehem Steel Company	
24	Boonton Molding Co.	
182	Borco Chemicals	
19	Borg-Warner, Marbon Chemi- cal Division	
274	Cadet Chemical Corp.	24
7 128	Cadillac Plastic & Chemical Co.	
140	Carbide and Carbon Chemicals Co., A Div. of Union Carbide	
212	and Carbon Corp. Carver, Fred S., Inc.	
1	Catalin Corp. of America	
	Celanese Corp. of America	
200	Export Division	
165	Plastics Division Textile Division	
33	Chemore Corporation	
4	Chicago Molded Products Corp.	
215	Ciba Co. Inc., Plastics Div.	
65	Cincinnati Milling Machine Co., The	
80	Claremont Pigment Dispersion Corp.	
206	Claremont Waste Mfg. Co.	
131	Clark, Cutler, McDermott Co., Air-Loc Division	
264	Classified	
230	Cleveland Process Co., The Columbian Carbon Company	Ath
48 51	Commercial Plastics & Supply	4th (
170	Corp. Commonwealth of Puerto Rico,	
	Economic Development Ad- ministration	7:
169	Conforming Matrix Corp.	
191	Continental Oil Company	

197 117 16	Cratex Manufacturing Co. Crucible Steel Co. of America Cumberland Engineering Company, Inc.
60 206	Dake Corporation
37 170 224	Davis, Joseph, Plastics Co. Dawson, F. C., Engineering Co. Dayton Rogers Mfg. Co.
212 184 230 261	Deakin, J. Arthur, & Son Deecy Products Co. Deluxe Saw & Tool Co. De Mattia Machine and Tool
194	Co. Detroit Macoid Corporation
214 155 276 249	Detroit Mold Engineering Co. Diamond Alkali Company Plastics Division Doven Machine & Engineering
247 232	Inc. Dow Chemical Co., The Dunning & Boschert Press Co., Inc.
58, 59	du Pont de Nemours, E. I., & Co. (Inc.) Film Dept.
210, 211	Pigments Dept. Polychemicals Dept.
d Cover,	Durez Plastics Division,
196 119	Hooker Electrochemical Co. Eastman Chemical Products,
145	Inc. Eastman Kodak Company.
170	Cellulose Products Div. Economic Development Administration, Commonwealth
74 241	of Puerto Rico Egan, Frank W., & Company Elmes Engineering Division, American Steel Foundries
82 153 182 235	Emery Industries, Inc. Enjay Company, Inc. Erdco Engineering Corp. Erie Plastics Division, Erie Re-
242, 243	sistor Corporation Escambia Chemical Corp.
271	Fabricon Products
56A 135	Farbwerke Hoechst AG Farrel-Birmingham Co., Inc.,
41 205	Watson-Stillman Press Div. Fellows Gear Shaper Co., The Ferro Chemical Corp., A Sub- sidiary of Ferro Corp. Fiberfil, Inc.
237 193	Fiberfil, Inc.
71	Fine Organics, Inc. Firestone Plastics Company, Chemical Sales Division
133	Food Machinery and Chemical Corp., Ohio-Apex Division
43 256 208	Foster Grant Co., Inc. Fostoria Pressed Steel Corp. French Oil Mill Mchry Co.
268 169 77	Gaynes Engineering Co. Geissel Mfg. Co., Inc. General American Transporta- tion Corp., Parker-Kalon Division
69	General Dyestuff Company
187 47	General Dyestuff Company General Electric Company General Roll Leaf Mfg. Co. General Tire & Rubber Co., The, Chemical Division
73, 262	Gering Products, Inc.
56 224	Gering Products, Inc. Girdler Company, The Glass Yarns and Deeside Fab- rics Ltd.

3 14, 15	Goodyear Tire & Rubber Com- pany, The
257 227	Goulding Manufacturing Co. Grace, W. R., & Co., Polymer Chemicals Division
224 209	Greater Miami Industrial Div. Gries Reproducer Corp.
163 188	Hale and Kullgren, Inc. Harchem Division, Wallace &
52, 252 26, 27	Tiernan, Inc. Harshaw Chemical Co., The Hercules Powder Co., Inc.,
60A	Cellulose Products Dept. Heyden Chemical Corp., American Plastics Corp. Subsidiary
180 218 2nd Cover, 196 260 21	Hinde & Dauch Hobbs Manufacturing Co. Hooker Electrochemical Co., Durez Plastics Division Hyde, A. L. Hydraulic Press Mfg. Co., The, A Division of Koehring Co.
30	Imperial Chemical Industries Limited
182 217 172 223 20, 265	Improved Machinery Inc. Industrial Heater Co., Inc. Industrial Mfg. Corp. Industrial Research Labs. Injection Molders Supply Co. Interchemical Corporation
208 63 198	Angier Adhesives Div. Finishes Div. Interplastics Corporation
234 55	Karlton Machinery Corp. Kellogg, M. W., Co., The, Chemical Mfg. Division
248	Kingsley Stamping Machine
181 218 17	Kohnstamm, H., & Co., Inc. Kramer, H. W., Co. Kurz-Kasch
79 181 31 121	L.O.F Glass Fibers Co. Lembo Machine Works, Inc. Lester-Phoenix, Inc. Lewis Welding & Engineering
209 250 223 202	Corp., The Liberty Machine Co. Inc. Litzler, C. A., Co., Inc. Logan Engineering Co. Lucidol Division, Wallace & Tiernan, Inc.
189, 190 136 19	Makray Manufacturing Co. Manufacturers' Literature Marblette Marbon Chemical, Division of Borg-Warner
176 216	Markem Machine Co. Mayflower Electronic Devices, Inc.
260 260 198 220	Mearl Corporation, The Merck & Co., Inc. Metalsmiths Metasap Chemical Co., A Nopco Subsidiary
162	Minerals & Chemicals Corp. of America
78 228	Minnesota Plastics Corp. Missouri Division of Resources & Devt.
13	Modern Plastic Machinery Corp.
53	Moslo Machinery Company (Continued on page 274)



Admex 745 hasn't been around very long, but it already has won an enthusiastic bunch of friends. People involved in rotational castings and slush molding work are particularly fond of it.

One big reason why this epoxy type plasticizer has made so many friends in rotational casting is that it gives controlled gelation, making possible even distribution of plastisol on the interior walls of the mold.

Those who cast such items as balls, bulbs, and automotive parts like the lively, rubber-like resiliency which Admex 745 contributes. Its unusual viscosity depressing characteristics when used in plastisols will give a genuine economic advantage, too. By adding small amounts of Admex 745, summertime viscosity increases can be minimized and borderline material made usable.

Admex 745 also provides remarkable low temperature flexibility . . . a quality which brings joy to the hearts of cold weather footwear manufacturers, for example.

If you count pennies (a fine way to make dollars), keep in mind that Admex 745 actually costs much less than the price per pound would seem to indicate. Admex 745's low weight per gallon (specific gravity 0.900) makes it important that you calculate its price on a volume basis. Other pertinent specifications, include: Color (Gardner Holt '53) is 3 Max., acid value is 1.0 Max., and viscosity is 0.5 Stokes (Approx.).

It's possible to carry on this way about Admex 745 for pages. In fact, we have done just that in a new technical bulletin which you can have free for the asking. Just fill out the coupon below.



ArcherDanielsMidland



OTHER ADM PRODUCTS: Linseed, Saybean and Marine Oils, Paint Vehicles, Synthetic and Natural Resins, Polyesters, Fatty Acids and Alcohols, Hydrogenated Glycarides, Sperm Oil, Foundry Binders, Industrial Cereals, Vegetable Proteins, Wheat Flour, Dehydrated Alfalfa, Livestock and Poolity Feeds.

Archer - Daniels - Midland Company
717 Investors Building, Minneapolis 4, Minnesota
Yes, please send free information on Admex 745, the easy-handling plasticizer.

Technical Bulletin Evaluation Sample
Name
Firm
Address
City
Tone
State

(Continued from page 272)

Mount Vernon Mills, Inc. Muehlstein, H., & Co., Inc.

Murray Corporation

228 Nash, J. M., Company
267 National Aniline Div., Allied
Chemical & Dye Corp.
57 National Lead Company
178, 179 National Rubber Machy. Co.
Naugatuck Chemical Division,
United States Rubber.

United States Rubber Negri Bossi & Co. Newark Die Company

Newbury Industries Niagara Blower Company

Nopco, Metasap Chemical Co. Subsidiary 220

Norton Laboratories, Inc.

Ohio-Apex Div., Food Machinery and Chemical Corp.
 Orange Products, Inc.

Packaging Industries Parker-Kalon Div., General American Transportation

Corporation

268 Pasadena Hydraulics, Inc.
203 Paterson Parchment Paper Co.
171 Peco Machinery Sales (Westminster) Limited

Pelron Corporation Perforating Industries, Inc. Permanent Label Corp. 256 214

Peter Partition Corp.
Peterson, A. W., & Sons Die 183

Co., Inc.
Pitt-Consol Chemical Co.
Pittsburgh Coke & Chemical 3rd Cover

239 Pittsburgh Plate Glass Co., Selectron Products Div.

176 Plandex Corporation
23 Plastics Engineering Co.
232 Price-Driscoll Corp. Projectile & Engineering Co. Ltd., The

8 Quinn-Berry Corp.

Radial Cutter Mfg. Corp. Radio Corp. of America Radio Receptor Co., Inc.

Reed Plastics Corp.

Reichhold Chemicals, Inc.

Reifenhauser, A. Robbins Plastic Machinery

Corp. Rohm & Haas Company Rubber Corp. of America

64 St. Petersburg Chamber of

Commerce 38, 39 St. Regis Paper Co.

68 Sanitized Sales Co. of America,

173 Schulman, A., Inc. 219 Schulz, Richard O., Co. 36 Schwartz Chemical Co., Inc.

Scranton Plastic Laminating Согр.

Sealomatic Electronics Corp. Seiberling Rubber Company, Plastics Division

Semet-Solvay Petrochemical Division, Allied Chemical & Dye Corp

Servospeed
Shaw, Francis, & Co. Ltd.
Shell Chemical Corporation
Siempelkamp, G., & Co.
Sinko Mfg. & Tool Co.

202

40 Solvic S.A. Spencer Chemical Company 75, 76 Standard Insulation Co.

186 Sterling, Inc. 114, 115 Stokes, F. J., Corporation

T & M Machine and Tool Corp. Thermel, Inc. Thoreson-McCosh, Inc.

Tinnerman Products, Inc. Titanium Pigment Corp. Troy Blanket Mills 263

Tupper Corporation
Turner Halsey Company

Union Carbide and Carbon Corporation

W

Bakelite Company Div. Carbide and Carbon Chemi-125-127 Co. Div.

80A, 80B Union Carbide International

Co. Division
U.S. Industrial Chemicals Co.
United States Rubber,
Naugatuck Chemical Div. 141, 185

Van Dorn Iron Works Co., The Vlchek Tool Co., The, Plastics Division

Wallace & Tiernan, Inc. Harchem Division

Lucidol Division Waterbury Companies, Inc. Watson-Stillman Press Div. 135

Farrel-Birmingham Co., Inc. Welding Engineers, Inc.

Wellington Sears Co. West Instrument Corporation 201 Wheelco Instruments Div.,

Wheelco Instruments Div., Barber-Colman Company Whitlock, C. H., Associates Wiegand, Edwin L., Co. Williams-White & Co.

Wilner Wood Products Co. Windsor, R. H., Ltd. Wood, R. D., Company 67 Wysong & Miles Co.

ORGANIC PEROXIDES

BENZOYL PEROXIDE

LAUROYL PEROXIDE

MEK PEROXIDE

Technical Data and samples available on request.

Manufactured by

CADET Chemical Corp.

Burt 1, New York

Distributed by CHEMICAL DEPT. McKESSON & ROBBINS, INC. 155 East 44th St., New York 17, N. Y.

Warehouse Stocks in Principal Cities

IRON-GUARO

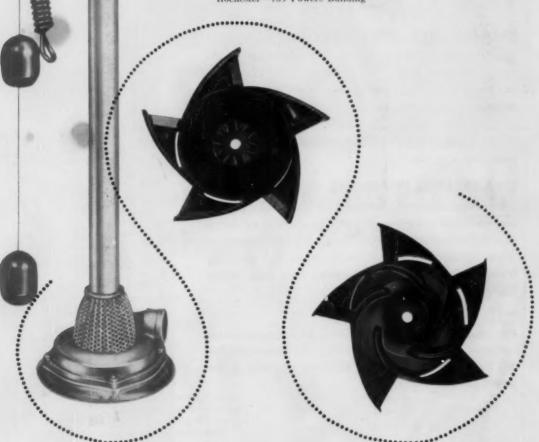
Companies you can trust ... trust Norton

◆ This precision manufactured part helps drain off destructive excess water. A sump pump impeller, it provides the kick that enables the pump to draw rapidly and thoroughly. Norton compression molds these phenolic pieces for the Penberthy Manufacturing Company, a division of the Buffalo-Eclipse Corporation.

Accurately controlled dimensions, light weight and smooth finish reduce wear and provide trouble-free operation throughout the life of the pump. And an additional bonus benefit is the low cost.

Next time you need a molded plastic part incorporating several characteristics—including the all important feature of economical cost—call on Norton.

Norton Laboratories, Inc., Lockport, New York Sales Office: New York—175 Fifth Avenue (Chicago) Elmhurst, Ill.—203 Elm Square Building Cleveland—20605 Kings Highway Detroit—3-167 General Motors Building Philadelphia—4719 Longshore Street Rochester—739 Powers Building



NORTON Laboratories, Inc.

COMPRESSION AND INJECTION MOLDING



Chemicals you live by USE

Diamond Vinyl Resins for high quality, high speed processing

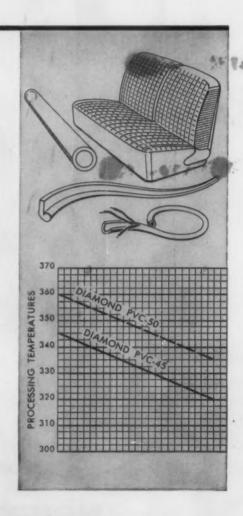
DIAMOND PVC-50-An outstanding general purpose resin especially well suited for profile extrusions, garden hose, thin film and wire insulation. PVC-50 has been accepted for use in all UL listed vinyl electrical compounds. It produces films and extrusions of exceptional clarity; dry blends rapidly and has the advantages of high bulk density, freedom from gel particles and good heat stability.

DIAMOND PVC-45—This newer DIAMOND resin is ideal for the production of film, sheeting and rigid and semi-rigid extrusions. PVC-45 has a unique combination of characteristics, all contributing to easier processing. These include low temperature calendering, easy dry blending, freedom from gel particles, high bulk density and good heat stability.

For information on DIAMOND PVC resins and technical cooperation, write DIAMOND ALKALI COMPANY, Plastics Division, 300 Union Commerce Building, Cleveland 14, Ohio, or your nearest DIAMOND Sales Office.

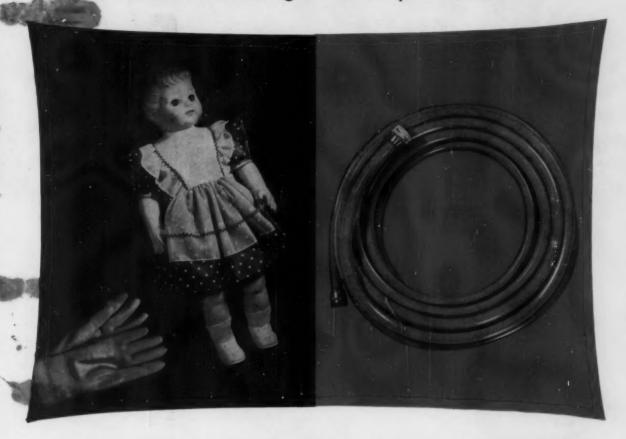
SALES OFFICES

Cincinnati 29, Ohie						. 4701 Paddock Road
Chicago 6, Illinois .						20 North Wacker Drive
Cleveland 13, Ohio		0		0		. 633 Penton Building
Houston 2, Texas .						1006 Main Street
Memphis 3, Tennesse	. 00					. 1381 Heistan Place
New York 16, New Y	ork		9		9	99 Park Avenue
Philadelphia 7, Pa.						12 South Twelfth Street
Pittsburgh 22, Pa.						, 1323 Oliver Building
St. Louis 8, Missouri						4246 Forest Park Blvd.





DIAMOND Diamond Chemicals For Plastisol Moldings...or Vinyl Extrusions...



Your Best Plasticizer Buy is <u>Still</u> Pittsburgh PX-114

LOW cost plus ease of processing . . . that's the reason-in-a-nutshell why Pittsburgh PX-114 is one of the most popular of all primary plasticizers for producing plastisol moldings and vinyl extrusions!

And with PX-114, you don't have to give an inch on quality, for it provides virtually the same finished product characteristics as DOP...but at appreciable savings.

PX-114 exhibits excellent performance in extruded products such as garden hose, welting, gaskets and wire jacketing. It is equally well suited for use in all types of dispersions such as slush or dip moldings with plastisols.

PX-114's excellent record of price stability is

PITTSBURGH Job-Rated PLASTICIZERS

a plus factor, too, when you're forecasting your overall production costs.

If you're not already acquainted with this outstanding cost-reducing plasticizer, write today for technical data, samples or the services of a Pittsburgh Industrial Chemicals man.





G-E PHENOLICS HELPED MOLDERS

2. AUTOMATIC MOLDING





3. IMPROVED IMPACT

... and a preview of profit opportunities to come through G-E progress in phenolics

In the plastics field, one fact emerges from 1956 to illuminate the year ahead: increased production and new markets are the molder's surest road to bigger profits.

During 1956, readers of this space saw—and many were quick to take advantage of—new G-E phenolic compounds that emphasize higher output, lower production overhead... greater profit potential. Among the new materials announced here were those in the panel shown above.

Look to G. E. for further progress in phenolics-THIS YEAR

Watch this space for announcements of new materials now in final stages of development: New nodular impact phenolics • New high-heat resistant phenolics • Improved rubber-phenolics.

These new powders will add another dimension to what is already the most diverse line of phenolic compounds in the industry. If you mold phenolics, there is a G-E compound to fit your job.

For more information on the new compounds described in the panel—or on the entire family of G-E phenolics, write General Electric Company, Section MP-2, Chemical Materials Department, Pittsfield, Massachusetts. See our catalog in SWEET'S.

 General Purpose – G. E.'s 12920 (black) and 12921 (brown) have demonstrated these big advantages over previously available grades: greater versatility, better finish, longer flow time, faster cure.

Automatic Moiding — G. E.'s 12902, a one-stage powder specifically designed for automatic presses, features fast cure, excellent release characteristics, low bulk factor and uniform granulation.

3. Improved impact—G. E.'s 12906 (black) is a new fast-cure improved impact material that is superior in nearly every application to any known conventional impact compound now available. Excellent preform and preheat characteristics permit fast molding cycles.

Progress Is Our Most Important Product

GENERAL & ELECTRIC